U.S. Fish & Wildlife Service

American Woodcock

Population Status, 2024

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U.S. Fish and Wildlife Service
Division of Migratory Bird Management
Branch of Assessment and Decision Support
11510 American Holly Drive
Laurel, MD 20708-4002

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Cover photograph: This year's American Woodcock Status Report is dedicated to the memory of Ron Kokel. Ron was a retired biologist with the U.S. Fish and Wildlife Division of Migratory Bird Management. He was devoted to American woodcock conservation and participated in the woodcock collection wing survey for many years. Ron passed away in October 2023 while in the woods pursuing his favorite bird. On the cover is a photo that Ron captured of his dog, Tre, pointing a woodcock.

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AMERICAN WOODCOCK POPULATION STATUS, 2024

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Abstract: The American Woodcock (*Scolopax minor*) Singing-ground Survey data for 2024 indicate that the index for singing males was significantly greater than last year in the Eastern Management Region, and similar to last year in the Central Management Region. Both regions had a non-significant trend over the most recent 10 years (2014–2024). Both regions had a significant, long-term (1968–2024) negative trend: Eastern = -0.70%/year; Central = -0.46%/year. The 2023 recruitment index in the U.S. portion of the Eastern Region (1.53 immatures per adult female) was 26.4% greater than the 2022 index and 5.0% lower than the long-term regional average, while the recruitment index in the Central Region (1.18 immatures per adult female) was 4.1% less than the 2022 index, and 20.3% less than the long-term regional average. Estimates from the Harvest Information Program indicated that U.S. woodcock hunters in the Eastern Region spent 238,400 days afield and harvested 78,700 woodcock during the 2023–24 season, while in the Central Region hunters spent 353,400 days afield and harvested 160,500 woodcock.

INTRODUCTION

The American woodcock is a popular game bird throughout eastern North America. The management objective of the U.S. Fish and Wildlife Service (USFWS) is to stabilize woodcock populations, while ultimately returning the population to a level that occurred in the early 1970s (Kelley et al. 2008). Reliable annual population estimates, harvest estimates, and information on recruitment and distribution are essential for comprehensive woodcock management. This information is difficult and often impractical to obtain. Woodcock are difficult to find and count because of their cryptic coloration, small size, and preference for areas with dense vegetation. The Singing-ground Survey (SGS) was developed to provide indices to changes in abundance. The Parts-collection Survey (PCS) provides annual indices of woodcock recruitment. The Harvest Information Program (HIP) utilizes a sampling frame of woodcock hunters to estimate annual harvest and hunter days spent afield.

This report summarizes the results of these surveys and presents an assessment of the population status of woodcock as of early June 2024. The report is intended to assist managers in regulating the sport harvest of woodcock and to draw attention to areas where management actions are needed. Historical woodcock hunting regulations are summarized in Appendix A.

The primary purpose of this report is to facilitate the prompt distribution of timely information. Results are preliminary and may change with the inclusion of additional data.

METHODS

Woodcock Management Regions

Woodcock are managed based on 2 regions or populations, Eastern and Central (Fig. 1), as recommended by Owen et al. (1977). Coon et al. (1977) reviewed the concept of management regions for woodcock and recommended the current configuration over several alternatives. This configuration was biologically justified because analysis of band recovery data indicated that there was little crossover between the regions (Krohn et al. 1974, Martin et al. 1969). Furthermore, the boundary between the two regions conforms to the boundary between the Atlantic and Mississippi Flyways. The results of the PCS and SGS, as well from HIP, are reported by state or province, and management region. Although state and province level results are included in this report, analyses are designed to support management decisions made at the management region scale.

Singing-ground Survey

The SGS was developed to exploit the conspicuous courtship display of the male woodcock. Early studies demonstrated that counts of singing males provide indices to woodcock population abundance and could be used to monitor annual changes (Mendall and Aldous 1943, Goudy 1960, Duke 1966, Whitcomb 1974). Before 1968, counts were conducted on nonrandomly located routes. Beginning in 1968, routes were relocated along lightly traveled secondary roads in the center of randomly chosen 10-minute degree blocks within each state

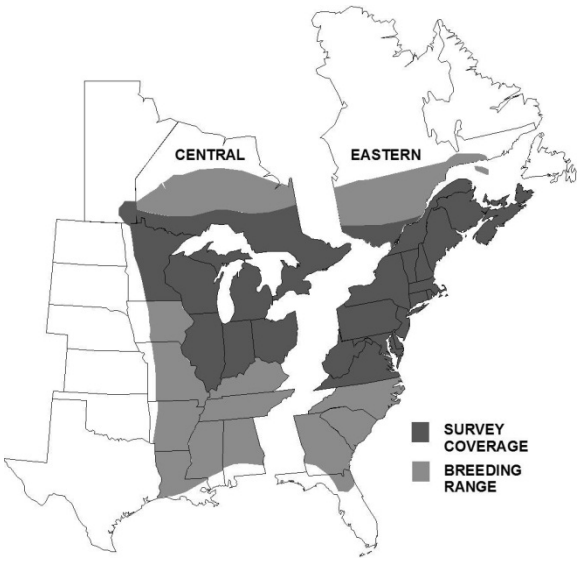

Fig. 1. Woodcock management regions, breeding range, and Singing-ground Survey coverage.

and province in the central and northern portions of the woodcock's breeding range (Fig. 1). Data collected prior to 1968 are not included in this report.

Each route was 3.6 miles (5.4 km) long and consisted of 10 listening points. The routes were surveyed shortly after sunset by an observer who drove to each of the 10 stops and recorded the number of woodcock heard peenting (the vocalization by displaying male woodcock on the ground). Acceptable dates for conducting the survey were assigned by latitude to coincide with peaks in courtship behavior of local woodcock. In most states and provinces, the peak of courtship activity (including local woodcock and woodcock still migrating) occurred earlier in the spring and local reproduction may have already been underway when the survey was conducted. However, it was necessary to conduct the survey during the designated survey dates to minimize the counting of migrating woodcock. Because adverse weather conditions may affect courtship behavior and/or the ability of observers to hear woodcock, surveys were only conducted when wind, precipitation, and temperature conditions were within prescribed limits.

The survey consists of about 1,500 routes. To avoid expending unnecessary resources and funds, approximately two-thirds of these routes were selected for survey each year. The remaining routes were carried as "constant zero" routes. Routes for which no woodcock were heard for 2 consecutive years enter this constant zero status and were not surveyed for the next 5 years. If woodcock were heard on a constant zero route during its next survey, the route reverted to normal status and was surveyed again each year. Data from constant zero routes were included in the analysis only for the years they were surveyed. Sauer and Bortner (1991) reviewed the implementation and analysis of the SGS in more detail.

Trends in the number of male woodcock heard were estimated using a hierarchical model. Sauer et al. (2008) described a hierarchical log-linear model for estimation of population change from SGS data. Sauer et al. (2021) compared the Sauer et al. (2008) model with a model with additional forms for year effects and the distribution of overdispersion effects and concluded that population change is best modeled as the difference in expected counts between successive years (their 'D' model). We used this new D model for inference in this report. The 2 model forms are similar except in how year effects are modeled. The old approach (denoted as the 'S' in Sauer et al. 2021) modeled year effects as random effects in the context of a slope parameter to estimate population change, whereas the D model describes population change as the difference in expected counts between successive years. The D model provides population trend and annual index values that are generally comparable to the estimates provided by the previous model, except that the D model provides slightly fewer extreme estimates of trend.

For the hierarchical model, the log of the expected value of the counts was modeled as a linear combination of strata-specific intercepts and year effects, a random effect for each unique combination of route and observer, a start-up effect on the route for first year counts by new observers, and overdispersion. The parameters of interest were treated as random and were assumed to follow distributions that were governed by additional parameters. The hierarchical model is fit using Bayesian methods. Markov-chain Monte Carlo methods were used to iteratively produce sequences of parameter estimates which were used to describe the distribution of the parameters of interest. After an initial "burn-in" period, means, medians, and credible (i.e., Bayesian confidence) intervals (CI) for the parameters were estimated from the replicates. Annual indices for a stratum (state or province) are a function of year effects, defined as exponentiated random strata and year effects. Population trends were defined as ratios of the indices at the start and end of the interval of interest, taken to the appropriate power to estimate a yearly change (Sauer et al. 2021). Trend estimates were expressed as percent change per year, while indices were expressed as the number of singing males per route. Annual indices were calculated for the 2 regions and each state and province, while short-term (2023-2024), 10-year (2014-2024) and long-term (1968–2024) trends were evaluated for each region as well as for each state and province.

Due to SARS-CoV-2 (i.e., coronavirus) related restrictions in Canada and the U.S., only a portion of the SGS (n=329 routes) was conducted in 2020. Indices for

states and provinces with little or no data for 2020 were estimated with the hierarchical model using strata-specific intercepts and year effects that were calculated from the limited 2020 data and the long-term dataset.

Credible intervals were used to describe uncertainty around the estimates when fitting hierarchical models. If the CI did not overlap 0 for a trend estimate, the trend was considered significant. We present the median and 95% CIs of 10,000 samples (i.e., we simulated 20,000 replicates and thinned by 2), which were calculated after an initial burn-in of 20,000 iterations to allow the series to converge. Refer to Link and Sauer (2002) and Sauer et al. (2008, 2021) for a detailed description of the statistical model and fitting process.

The reported sample sizes are the number of routes on which trend estimates are based. Each route was to be surveyed during the peak time of daily singing activity. For editing purposes, "acceptable" stops were surveyed between 22 and 58 minutes after sunset (or between 15 and 51 minutes after sunset on overcast evenings). Due to observer error or road conditions, some stops on some routes were surveyed before or after the peak times of singing activity. Earlier analysis revealed that routes with 8 or fewer acceptable stops tended to be biased low. Beginning with data from 1988, only route observations with at least 9 acceptable stops were included in the analysis. Route observations prior to 1988 are used regardless of the number of acceptable stops. Routes for which data were received after 8 July 2024 were not included in this analysis but will be included in future trend estimates.

Parts-collection Survey

The primary objective of the PCS is to provide data on the reproductive success of woodcock. The survey is administered as a cooperative effort between woodcock hunters, the USFWS, and state wildlife agencies. Participants in the 2023 (i.e., covers the September 2023 to January 2024 hunting season) survey included hunters who either: (1) participated in past surveys; (2) were a subset of hunters who indicated on the HIP Survey that they hunted woodcock; or (3) contacted the USFWS to volunteer for the survey.

Parts-collection Survey participants were provided with prepaid mailing envelopes and asked to submit 1 wing from each woodcock they harvested. Hunters were asked to record the date of the hunt as well as the state and county where the bird was shot. Hunters were not asked to submit envelopes for unsuccessful hunts. The age and gender of birds were determined by examining plumage characteristics (Martin 1964, Sepik 1994).

The ratio of immature birds per adult female in the harvest provides an index to recruitment of young into the population. The 2023 recruitment index for each state with ≥125 submitted wings was calculated as the number of immatures per adult female. The regional indices for 2023 were weighted by the relative contribution of each state to the cumulative number of adult female and immature wings received during 1963–2022.

Harvest Information Program

The HIP was cooperatively developed by the USFWS and state wildlife agencies to provide reliable annual estimates of hunter activity and harvest for all migratory game birds (Elden et al. 2002). The HIP sampling frame consists of all migratory game bird hunters. Under this program, state wildlife agencies collect the name, address, and additional information from each migratory bird hunter in their state and send that information to the USFWS. The USFWS then selects stratified random samples of those hunters and asks them to voluntarily provide detailed information about their hunting activity. For example, hunters selected for the woodcock harvest survey are asked to complete a daily diary about their woodcock hunting and harvest during the current year's hunting season. Their responses are then used to develop nationwide woodcock harvest estimates. The HIP survey estimates of woodcock harvest have been available since 1999. Although estimates from 1999–2002 have been finalized, the estimates from 2003–2023 should be considered preliminary as refinements are still being made in the sampling frame and estimation techniques. Canadian hunter and harvest estimates, which were obtained through the Canadian National Harvest Survey Program, are presented in Appendix B (Gendron and Smith 2024).

RESULTS AND DISCUSSION

Singing-ground Survey

Data for 817 routes were submitted by 8 July 2024 (Table 1). Compared to last year the number of woodcock heard in 2024 significantly increased in the Eastern Management Region and did not change in the Central Management Region (Table 1). Trends for individual states and provinces are reported in Table 1. Consistency in route coverage over time is a critical component of precision in estimation of population change. Low precision of 2-year change estimates reflects the low numbers of routes surveyed by the same observer in both years. Ensuring that observers participate for several years on the same route would greatly enhance the quality of the results.

The 10-year trend (2014–2024) indicated no significant change in woodcock heard in the Eastern and Central Management Regions (Table 1, Fig. 2). Many states and provinces in both management regions have experienced significant long-term (1968–2024) declines as measured by the SGS (Table 1, Fig. 3). The long-term trend estimate was −0.70%/year in the Eastern

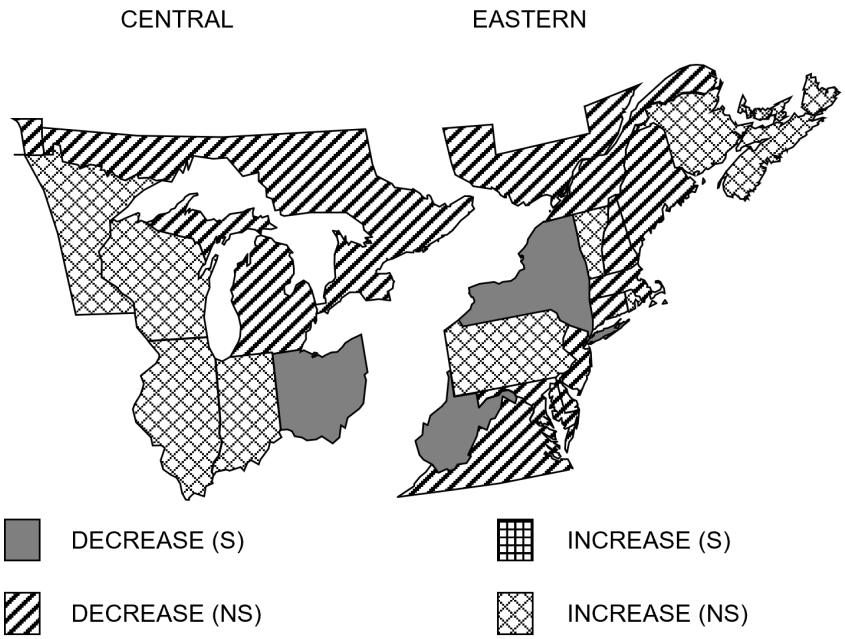

Fig. 2. Ten-year trends in the number of American woodcock heard on the Singing-ground Survey, 2014–2024, as determined by the hierarchical modeling method. A significant trend (S) does not include zero in the 95% credible interval, while a non-significant (NS) trend does include zero.

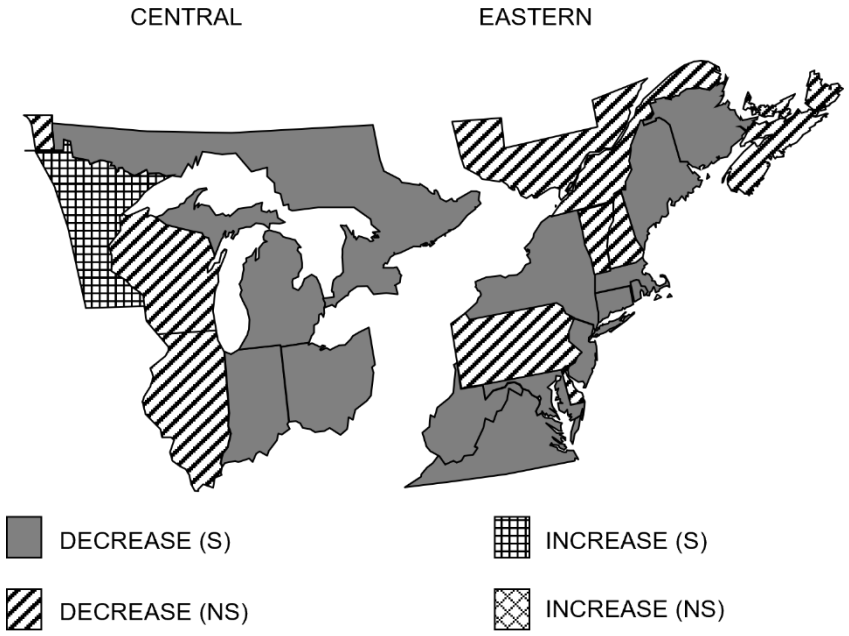

Fig. 3. Long-term trends in the number of American woodcock heard on the Singing-ground Survey, 1968–2024, as determined by the hierarchical modeling method. A significant trend (S) does not include zero in the 95% credible interval, while a non-significant (NS) trend does include zero.

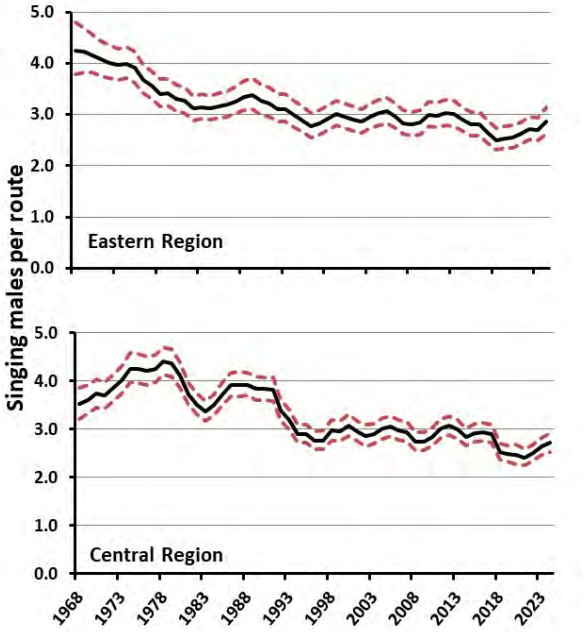

Fig. 4. Annual indices of the number of woodcock heard during the Singing-ground Survey, 1968–2024 as estimated using hierarchical modeling. The red dashed lines represent the 95% credible interval for the estimate**.**

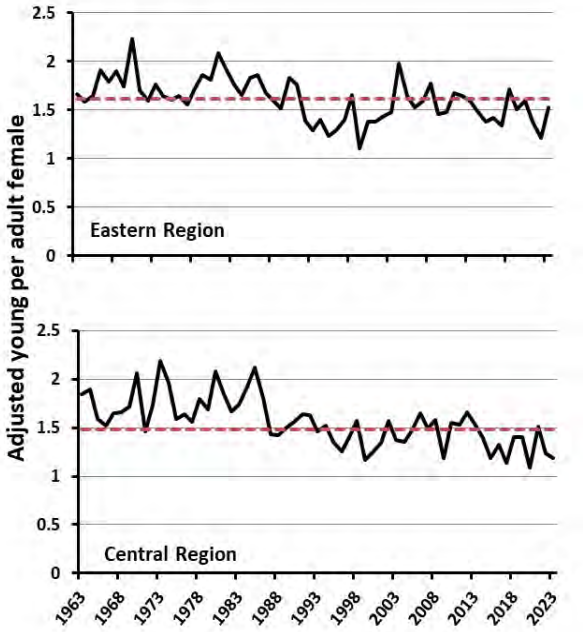

Fig. 5. Annual indices of recruitment (U.S.), 1963–2023. The red dashed line is the 1963–2022 average.

Management Region and -0.46%/year in the Central Management Region (Table 1).

In the Eastern Region, the 2024 index was 2.87 singing males per route, while it was 2.72 in the Central Management Region (Figure 4, Table 2). Annual indices (1968–2024) by state, province, and region are available in Table 2.

Parts-collection Survey

A total of 943 woodcock hunters (Table 3) from states with a woodcock season sent in a total of 8,564 usable woodcock wings for the 2023 PCS (Table 4).

The 2023 recruitment index in the U.S. portion of the Eastern Region (1.53 immatures per adult female) was 26.4% greater than the 2022 index of 1.21, and 5.0% less than the long-term (1963–2022) regional average of 1.61 (Table 4, Fig 5). In the Central Region, the 2023 recruitment index (1.18 immatures per adult female) was 4.1% less than the 2022 index of 1.23 and was 20.3% less than the long-term regional average of 1.48 (Table 4, Fig 5). Percent change for all comparisons was calculated using unrounded recruitment indices.

Harvest Information Program

Estimates of woodcock harvest, number of active hunters, days afield, and seasonal hunting success from the 2023–2024 HIP survey are provided in Table 5. In the Eastern Management Region, woodcock hunters spent an estimated 238,400 days afield (Figure 6) and harvested 78,700 birds (Figure 7) during the 2023–2024 hunting season. In the Eastern Region, harvest in 2023–2024 was 6.3% greater than the long-term (1999–2022) average (74,000 birds/year) and 20.3% greater than last year (65,400 birds). Woodcock hunters in the Central Region spent an estimated 353,400 days afield (Figure 6) and harvested 160,500 birds (Figure 7) during the 2023–24 hunting season. In the Central Region, harvest in 2023–24 was 15.7% less than the long-term (1999–2022) average (190,500 birds/year) but 42.7% greater than last year (112,500 birds).

Although HIP provides statewide estimates of woodcock hunter numbers, it is not possible to develop regional estimates due to some hunters being registered for HIP in more than 1 state. Therefore, regional estimates of seasonal hunting success rates cannot be determined on a per hunter basis. All estimates have been rounded to the nearest hundred. Data from Canada indicate that the annual number of successful hunters and annual harvest have been similar since 2009 (Appendix B). The most recent data available indicate that an estimated 2,858 successful hunters harvested 20,087 woodcock during the 2022 season in Canada (Gendron and Smith 2024; Appendix B).

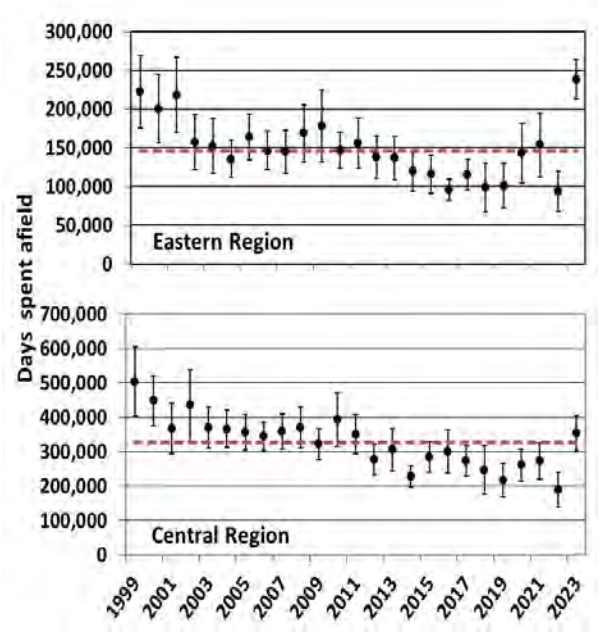

Fig. 6. Harvest Information Program Survey estimates of days spent afield by U.S. woodcock hunters, 1999–2023. The dashed line represents the 1999–2022 average and error bars represent the 95% confidence interval of the point estimate.

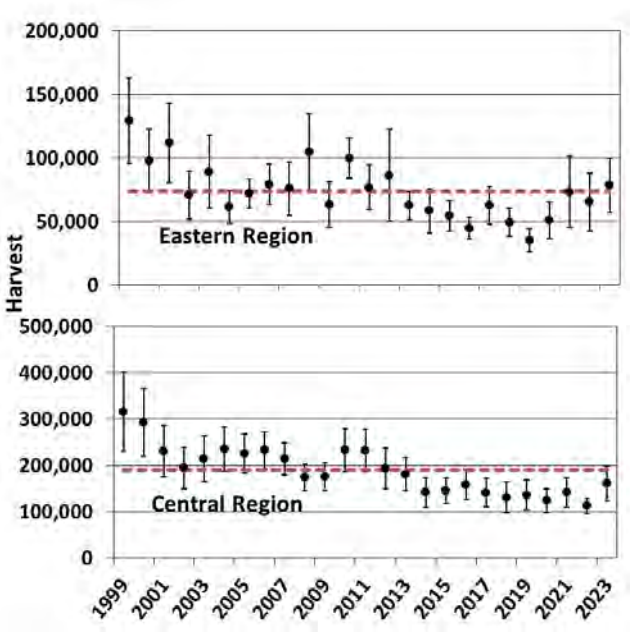

Fig. 7. Harvest Information Program Survey estimates of U.S. woodcock harvest, 1999–2023. The dashed line represents the 1999–2022 average and the error bars represent the 95% confidence interval of the point estimate.

Acknowledgements

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Table 1. Short-term (2023–2024), 10-year (2014–2024), and long-term (1968–2024) trends (% change per year[a]) in the number of American woodcock heard during the Singing-ground Survey. Trends and 95% credible intervals (CI) were estimated using a hierarchical log-linear modeling technique (Sauer et al. 2021).

State, Province, or Region	Routes 2023[b]	Routes 2024[c]	n[d]	Short-Term % Change	Short-term Lower 95% CI	Short-term Upper 95% CI	10-year % Change	10-year Lower 95% CI	10-year Upper 95% CI	Long-term % Change	Long-Term Lower 95% CI	Long-Term Upper 95% CI
CT	3	3	11	-0.74	-24.46	31.28	-1.95	-7.47	3.27	-2.16	-3.76	-0.71
DE	0	1	3	-0.39	-28.07	37.99	-0.82	-11.17	8.30	-1.68	-6.18	0.74
ME	54	54	78	7.97	-5.23	24.98	-0.62	-2.47	1.39	-0.83	-1.27	-0.37
MD	9	7	26	-0.56	-24.13	29.41	-2.57	-8.80	3.45	-3.23	-4.76	-1.88
MA	9	9	23	-0.93	-20.48	23.29	-2.89	-6.84	1.06	-2.49	-3.48	-1.54
NB	53	56	76	16.20	1.08	34.69	0.72	-1.15	2.59	-0.68	-1.24	-0.15
NH	14	12	19	-0.45	-18.43	20.21	-1.55	-5.18	1.88	-0.55	-1.39	0.33
NJ	9	7	19	-0.88	-31.72	41.29	-0.57	-8.29	7.76	-3.86	-5.26	-2.45
NY	82	80	120	1.33	-9.08	13.48	-1.80	-3.48	-0.13	-0.77	-1.18	-0.38
NS	41	47	67	5.08	-7.80	20.63	1.33	-0.71	3.40	-0.15	-0.74	0.40
PA	31	34	86	2.94	-12.22	22.01	2.30	-0.64	5.63	-0.40	-1.00	0.22
PEI	9	9	13	2.89	-15.79	27.57	1.21	-2.30	4.84	-0.45	-1.45	0.52
QUE	36	37	158	2.51	-8.89	17.33	-0.33	-2.73	2.06	-0.15	-0.85	0.60
RI	1	3	5	-2.68	-37.61	42.88	1.11	-8.97	14.76	-2.85	-5.74	-0.27
VT	18	15	24	7.63	-13.21	36.18	1.85	-1.40	5.27	-0.38	-1.21	0.53
VA	18	8	75	-2.48	-29.98	32.26	-1.45	-8.95	6.05	-4.20	-5.57	-3.00
WV	19	19	59	-0.32	-18.18	22.09	-3.63	-7.61	-0.06	-2.46	-3.40	-1.60
Eastern	**406**	**401**	**862**	**6.03**	**0.58**	**12.03**	**-0.11**	**-1.00**	**0.75**	**-0.70**	**-0.95**	**-0.46**
IL	20	18	51	14.44	-29.06	103.20	4.58	-4.60	14.84	-0.61	-2.49	1.43
IN	11	19	63	5.69	-20.36	47.13	0.02	-6.47	7.13	-3.12	-4.29	-2.04
MB[e]	13	9	31	1.23	-16.54	24.40	-0.15	-3.27	3.22	-0.46	-2.57	1.59
MI	113	101	161	3.45	-6.55	14.63	-1.24	-2.49	0.09	-0.59	-0.91	-0.27
MN	78	78	128	1.33	-10.93	15.21	1.61	-0.05	3.43	0.99	0.50	1.52
OH	34	27	74	10.88	-8.45	41.15	-3.76	-6.74	-0.61	-1.83	-2.51	-1.17
ON	89	82	179	3.86	-7.96	17.61	-1.35	-2.98	0.31	-0.91	-1.30	-0.50
WI	83	82	134	1.74	-9.82	14.94	0.60	-1.12	2.36	-0.02	-0.43	0.38
Central	**441**	**416**	**790**	**3.18**	**-2.39**	**9.21**	**-0.40**	**-1.15**	**0.37**	**-0.46**	**-0.65**	**-0.27**
Continent	**847**	**817**	**1,652**	**4.63**	**0.69**	**8.88**	**-0.25**	**-0.83**	**0.33**	**-0.59**	**-0.75**	**-0.43**

[a] Median of route trends estimated used hierarchical modeling. To estimate the total percent change over several years, use: $(100((\%\ change/100)+1)^{y})-100$, where y is the number of years. Note: extrapolating the estimated trend statistic (% change per year) over time (e.g., 30 years) may exaggerate the total change over the period.

[b] Total number of routes surveyed in 2023.

[c] Total number of routes surveyed in 2024 for which data were received by 8 July 2024.

[d] Number of routes with at least 1 year of non-zero data between 1968 and 2024.

[e] Manitoba began participating in the Singing-ground Survey in 1992.

Table 2. Breeding population indices (singing-males per route) for American woodcock from the Singing-ground Survey, 1968–2024. These indices are based on 1968–2024 trends that were estimated using hierarchical modeling techniques. Dashes indicate no data were available for that year.

State, Province, or Region	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Eastern Region																
CT	----	3.06	3.10	2.95	2.88	2.65	2.48	2.27	1.88	1.65	1.44	1.40	1.40	1.44	1.52	1.47
DE	0.85	0.85	0.85	0.83	0.84	0.84	0.83	0.82	0.72	0.67	0.64	0.63	0.64	0.65	0.66	0.67
MA	----	3.81	3.91	3.92	3.71	3.73	3.37	2.82	2.55	2.43	2.33	2.31	2.12	2.06	1.87	1.75
MD	1.78	1.82	1.75	1.73	1.66	1.61	1.53	1.46	1.32	1.30	1.32	1.32	1.35	1.28	1.15	1.00
ME	6.65	6.75	7.11	6.82	6.78	7.02	7.29	7.38	6.82	5.94	5.61	5.69	5.28	5.41	4.74	4.88
NB	----	10.44	9.74	8.80	8.38	7.88	8.13	8.21	6.98	7.20	6.14	5.96	5.34	5.55	5.35	5.23
NH	----	3.92	3.99	3.82	3.90	3.63	3.75	3.66	3.59	3.53	3.44	3.39	3.44	3.29	3.01	2.97
NJ	4.13	4.28	4.82	5.72	5.28	5.73	5.30	4.24	3.14	2.74	2.39	2.41	2.03	1.83	1.74	1.82
NS	4.78	4.38	4.00	4.19	4.20	4.36	4.47	4.34	4.18	4.08	4.04	3.68	3.45	3.20	3.07	3.14
NY	4.59	4.60	4.34	4.46	4.41	4.42	4.34	4.04	3.94	3.85	3.69	3.89	4.14	4.05	3.84	3.87
PA	2.09	2.07	2.17	2.14	2.07	1.98	1.80	1.74	1.70	1.65	1.59	1.56	1.44	1.38	1.34	1.35
PEI	----	5.15	5.22	5.38	5.06	5.05	5.33	5.72	5.37	4.96	4.59	4.27	3.77	3.55	3.61	3.92
QUE	----	----	----	4.98	5.05	5.00	5.05	5.08	5.11	5.22	5.53	5.73	5.75	5.61	5.60	5.71
RI	----	1.32	1.37	1.54	1.44	1.29	1.10	0.95	0.81	0.70	0.61	0.56	0.52	0.50	0.49	0.46
VA	----	1.35	1.32	1.16	1.04	0.96	1.08	1.03	0.98	0.92	0.82	0.76	0.71	0.75	0.78	0.76
VT	----	3.53	3.94	4.03	4.33	4.25	4.63	5.01	5.13	4.91	4.03	3.62	3.18	2.69	2.29	2.51
WV	1.59	1.58	1.48	1.44	1.48	1.41	1.33	1.28	1.17	1.06	0.97	1.03	1.05	1.12	1.09	1.03
Region	**4.25**	**4.22**	**4.16**	**4.08**	**4.01**	**3.97**	**3.99**	**3.91**	**3.68**	**3.57**	**3.41**	**3.43**	**3.31**	**3.27**	**3.12**	**3.15**
Central Region																
IL	----	----	0.25	0.29	0.29	0.28	0.30	0.28	0.25	0.28	0.33	0.32	0.33	0.42	0.45	0.77
IN	1.37	1.11	1.00	0.92	1.06	1.02	0.91	0.80	0.77	0.75	0.79	0.87	0.79	0.77	0.63	0.60
MB	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MI	7.00	6.96	6.93	6.67	6.81	7.24	8.09	8.28	7.98	7.60	7.93	7.85	7.38	6.66	6.62	5.94
MN	----	2.37	2.47	2.72	2.90	3.34	3.89	3.88	3.96	4.09	4.30	4.19	4.48	4.15	3.95	3.62
OH	----	----	1.66	1.58	1.55	1.47	1.52	1.44	1.51	1.45	1.32	1.24	1.25	1.28	1.17	1.16
ON	7.37	8.11	8.61	8.49	9.04	9.09	9.18	9.02	9.18	9.50	9.80	9.90	9.17	8.11	7.06	6.84
WI	3.44	3.55	3.92	3.93	4.04	4.24	4.38	4.44	4.29	4.57	4.74	4.69	3.99	3.47	3.44	3.42
Region	**3.52**	**3.60**	**3.73**	**3.69**	**3.85**	**4.01**	**4.25**	**4.25**	**4.21**	**4.25**	**4.40**	**4.38**	**4.11**	**3.73**	**3.51**	**3.37**
Continent	**3.89**	**3.92**	**3.95**	**3.89**	**3.93**	**3.99**	**4.12**	**4.08**	**3.94**	**3.91**	**3.90**	**3.90**	**3.71**	**3.50**	**3.32**	**3.26**

Table 2. Continued

State, Province, or Region	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Eastern Region																
CT	1.42	1.42	1.44	1.38	1.37	1.22	1.15	1.10	1.04	1.00	1.04	1.10	1.12	1.08	1.05	1.04
DE	0.65	0.64	0.64	0.64	0.64	0.64	0.63	0.61	0.61	0.62	0.64	0.65	0.64	0.64	0.63	0.60
MA	1.79	1.81	1.77	1.72	1.65	1.54	1.47	1.41	1.33	1.29	1.30	1.32	1.37	1.46	1.56	1.73
MD	0.92	0.82	0.73	0.67	0.63	0.60	0.58	0.54	0.50	0.50	0.50	0.49	0.48	0.45	0.43	0.44
ME	5.08	5.35	5.74	6.01	5.77	5.57	4.86	4.87	4.49	4.49	4.26	4.11	3.75	3.84	3.96	4.23
NB	4.90	4.86	4.52	4.76	5.40	6.04	5.59	5.27	5.28	5.91	6.12	5.82	5.44	5.78	6.01	6.57
NH	3.03	3.28	3.73	3.60	3.49	3.38	3.29	3.34	3.29	3.36	3.51	3.81	3.95	4.04	4.06	4.07
NJ	1.90	1.88	1.81	1.83	1.59	1.45	1.33	1.21	1.05	0.93	0.87	0.91	0.90	0.85	0.89	0.92
NS	3.14	3.23	3.27	3.10	3.16	3.15	3.11	3.26	3.36	3.41	3.30	3.37	3.44	3.41	3.55	3.83
NY	3.67	3.80	3.65	3.60	3.68	3.57	3.76	3.78	3.56	3.33	3.04	2.97	2.88	2.90	2.96	3.00
PA	1.36	1.35	1.36	1.35	1.35	1.39	1.50	1.58	1.49	1.46	1.37	1.41	1.43	1.43	1.48	1.40
PEI	4.18	4.33	4.47	4.34	4.55	4.62	4.34	4.15	4.00	3.83	3.75	3.88	4.09	4.05	3.88	3.66
QUE	5.74	5.85	6.04	6.33	6.63	6.80	6.58	6.36	6.26	6.20	5.91	5.48	5.20	5.23	5.44	5.39
RI	0.43	0.40	0.38	0.37	0.36	0.36	0.36	0.36	0.36	0.37	0.37	0.37	0.36	0.34	0.33	0.32
VA	0.83	0.60	0.57	0.53	0.47	0.44	0.44	0.43	0.44	0.42	0.38	0.33	0.32	0.32	0.28	0.27
VT	2.59	2.66	2.97	3.43	3.79	3.79	3.58	3.36	2.78	2.71	2.63	2.60	2.64	2.86	3.25	3.69
WV	0.98	0.93	0.91	0.88	0.85	0.84	0.84	0.80	0.79	0.78	0.79	0.82	0.78	0.76	0.72	0.70
Region	**3.12**	**3.16**	**3.19**	**3.26**	**3.35**	**3.38**	**3.27**	**3.22**	**3.10**	**3.11**	**2.99**	**2.89**	**2.78**	**2.83**	**2.92**	**3.01**
Central Region																
IL	0.80	0.97	0.99	1.03	0.68	0.63	0.52	0.60	0.53	0.51	0.43	0.38	0.37	0.37	0.40	0.43
IN	0.58	0.58	0.63	0.62	0.59	0.58	0.66	0.66	0.61	0.53	0.48	0.44	0.41	0.41	0.43	0.41
MB	----	----	----	----	----	----	----	----	6.15	6.20	6.01	5.72	4.97	4.11	4.13	4.16
MI	6.44	6.71	6.96	6.74	7.00	6.94	7.00	7.21	6.04	5.74	5.25	5.50	5.39	5.38	5.90	5.42
MN	3.56	3.86	4.10	4.21	4.46	4.07	4.46	4.32	3.83	3.70	3.43	3.41	3.29	3.15	3.50	3.74
OH	1.15	1.08	1.04	1.04	1.09	1.06	1.20	1.17	1.13	1.05	1.01	0.96	0.92	0.85	0.86	0.80
ON	6.99	7.68	8.02	8.04	8.09	8.09	7.77	7.67	7.16	6.66	5.91	5.85	5.25	5.49	5.73	5.77
WI	3.64	3.77	4.15	4.26	4.10	4.06	3.88	3.70	3.20	3.05	2.78	2.73	2.67	2.65	2.80	3.05
Region	**3.50**	**3.73**	**3.92**	**3.92**	**3.93**	**3.84**	**3.84**	**3.82**	**3.38**	**3.20**	**2.90**	**2.90**	**2.77**	**2.76**	**2.97**	**2.96**
Continent	**3.31**	**3.44**	**3.56**	**3.59**	**3.64**	**3.61**	**3.55**	**3.52**	**3.24**	**3.15**	**2.95**	**2.90**	**2.77**	**2.80**	**2.95**	**2.99**

Table 2. Continued

State, Province, or Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Eastern Region																
CT	0.96	0.88	0.84	0.82	0.81	0.82	0.83	0.87	0.92	0.97	1.03	1.13	1.16	1.13	1.12	1.07
DE	0.57	0.53	0.50	0.48	0.46	0.44	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.35	0.34
MA	1.71	1.65	1.67	1.70	1.74	1.67	1.64	1.59	1.63	1.59	1.50	1.40	1.31	1.27	1.27	1.29
MD	0.47	0.49	0.47	0.46	0.46	0.45	0.47	0.46	0.45	0.43	0.41	0.38	0.38	0.37	0.37	0.37
ME	4.38	4.13	3.96	4.16	4.37	4.50	4.44	4.24	4.24	4.26	4.54	4.71	4.74	4.67	4.45	4.16
NB	6.61	6.79	6.85	7.27	7.44	7.80	7.24	6.71	6.36	6.13	7.17	7.23	7.54	7.17	6.70	6.10
NH	3.83	3.81	3.84	4.01	4.02	3.86	3.51	3.15	3.14	3.39	3.48	3.38	3.50	3.49	3.41	3.12
NJ	0.87	0.80	0.71	0.67	0.58	0.54	0.54	0.56	0.55	0.56	0.49	0.53	0.57	0.54	0.48	0.41
NS	3.85	3.67	3.44	3.38	3.48	3.38	3.25	3.18	3.13	3.23	3.55	3.55	3.89	4.11	3.84	3.44
NY	2.93	2.89	2.92	3.07	3.24	3.19	3.22	3.12	3.12	3.34	3.55	3.50	3.57	3.60	3.55	3.70
PA	1.29	1.36	1.40	1.44	1.48	1.51	1.46	1.47	1.57	1.61	1.61	1.44	1.30	1.25	1.32	1.37
PEI	3.55	3.26	2.96	2.91	2.95	3.11	3.24	3.19	3.03	3.07	3.10	3.30	3.51	3.46	3.55	3.28
QUE	5.19	5.13	5.06	5.11	5.18	5.21	5.00	4.85	4.78	4.81	4.80	4.78	4.76	4.87	4.75	4.68
RI	0.32	0.31	0.30	0.28	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.23	0.24	0.24
VA	0.25	0.22	0.21	0.21	0.20	0.19	0.18	0.18	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.13
VT	3.73	3.28	3.00	3.04	3.12	3.23	3.15	2.83	2.64	2.67	2.73	2.66	2.70	2.56	2.39	2.40
WV	0.67	0.63	0.61	0.60	0.57	0.56	0.56	0.59	0.61	0.62	0.62	0.64	0.63	0.59	0.57	0.54
Region	**2.96**	**2.91**	**2.87**	**2.95**	**3.03**	**3.06**	**2.96**	**2.84**	**2.80**	**2.84**	**3.00**	**2.98**	**3.02**	**3.01**	**2.90**	**2.80**
Central Region																
IL	0.44	0.50	0.55	0.70	0.68	0.45	0.39	0.27	0.21	0.17	0.16	0.13	0.11	0.10	0.11	0.14
IN	0.38	0.37	0.33	0.31	0.32	0.32	0.29	0.28	0.27	0.27	0.27	0.25	0.25	0.24	0.23	0.22
MB	4.29	4.25	4.01	4.19	4.20	4.44	4.33	4.38	4.40	4.60	4.85	5.22	5.13	4.83	4.82	5.12
MI	5.45	5.26	5.36	5.53	5.60	5.45	5.10	4.93	4.67	4.69	4.91	5.36	5.65	5.83	5.69	5.60
MN	4.08	3.79	3.33	3.30	3.44	3.73	3.69	3.69	3.52	3.81	4.38	4.40	4.21	3.77	3.48	4.24
OH	0.79	0.79	0.79	0.84	0.99	0.98	0.92	0.80	0.84	0.96	0.98	0.99	0.97	0.95	0.90	0.88
ON	6.27	6.03	5.95	5.74	5.97	6.24	6.21	6.14	5.54	5.16	4.97	5.32	5.44	5.23	5.08	4.92
WI	2.99	2.86	2.64	2.72	2.85	3.12	3.13	3.34	3.15	3.16	3.28	3.55	3.70	3.64	3.19	3.33
Region	**3.07**	**2.95**	**2.86**	**2.90**	**3.01**	**3.06**	**2.97**	**2.93**	**2.74**	**2.74**	**2.85**	**3.01**	**3.07**	**2.99**	**2.83**	**2.92**
Continent	**3.02**	**2.93**	**2.87**	**2.93**	**3.02**	**3.06**	**2.97**	**2.89**	**2.77**	**2.79**	**2.93**	**3.00**	**3.05**	**3.00**	**2.87**	**2.87**

Table 2. Continued

State, Province, or Region	2016	2017	2018	2019	2020	2021	2022	2023	2024
Eastern Region									
CT	1.07	1.06	1.04	0.99	0.98	0.97	0.96	0.92	0.91
DE	0.34	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32
MA	1.22	1.11	1.02	0.97	0.93	0.93	0.97	0.96	0.95
MD	0.37	0.37	0.35	0.33	0.32	0.30	0.29	0.29	0.29
ME	4.29	3.79	3.56	3.75	3.82	4.03	4.06	3.87	4.19
NB	6.06	5.08	4.76	5.42	5.41	5.41	5.91	6.18	7.20
NH	2.95	2.68	2.57	2.56	2.74	2.89	2.96	2.93	2.90
NJ	0.39	0.36	0.35	0.35	0.38	0.40	0.45	0.46	0.46
NS	3.42	3.31	3.25	3.32	3.33	3.64	4.05	4.18	4.39
NY	3.67	3.61	3.27	3.19	3.15	3.11	3.05	2.92	2.97
PA	1.41	1.41	1.42	1.42	1.45	1.49	1.54	1.62	1.66
PEI	3.04	3.13	3.12	3.25	3.56	3.92	3.94	3.89	4.00
QUE	4.66	4.57	4.39	4.26	4.34	4.43	4.52	4.47	4.59
RI	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.28	0.27
VA	0.12	0.12	0.12	0.13	0.14	0.14	0.13	0.13	0.13
VT	2.59	2.46	2.41	2.15	2.11	2.34	2.67	2.66	2.88
WV	0.53	0.53	0.50	0.49	0.47	0.45	0.42	0.40	0.39
Region	**2.81**	**2.64**	**2.50**	**2.54**	**2.56**	**2.62**	**2.71**	**2.71**	**2.87**
Central Region									
IL	0.13	0.14	0.15	0.17	0.21	0.18	0.21	0.15	0.18
IN	0.23	0.23	0.23	0.21	0.21	0.20	0.21	0.22	0.23
MB	5.33	5.71	5.41	5.29	5.08	4.89	4.69	4.69	4.76
MI	5.31	5.06	4.10	4.24	4.23	4.23	4.64	4.86	5.03
MN	4.91	5.01	4.45	4.18	4.08	3.81	3.80	4.03	4.09
OH	0.82	0.74	0.73	0.73	0.64	0.56	0.54	0.55	0.61
ON	4.79	4.66	4.12	3.86	3.87	3.89	3.98	4.27	4.44
WI	3.37	3.49	3.06	3.13	3.16	3.11	3.17	3.33	3.38
Region	**2.94**	**2.91**	**2.53**	**2.49**	**2.48**	**2.41**	**2.51**	**2.64**	**2.72**
Continent	**2.88**	**2.77**	**2.52**	**2.51**	**2.52**	**2.52**	**2.61**	**2.67**	**2.80**

Table 3. The number of U.S. hunters by state who submitted woodcock wings for the 2022–2023 and 2023–2024 Parts-collection Surveys. This number may include a small number of hunters who were sent envelopes in prior years and who subsequently submitted wings from birds shot in the current survey year. In addition, some hunters hunted and submitted wings from more than 1 state.

State of residence	2022-2023 Season	2023-2024 Season
Alabama	3	1
Arkansas	1	3
Connecticut	13	15
Delaware	6	7
Florida	0	0
Georgia	3	9
Illinois	1	0
Indiana	14	14
Iowa	2	4
Kansas	0	1
Kentucky	3	4
Louisiana	10	16
Maine	89	81
Maryland	8	11
Massachusetts	20	28
Michigan	159	274
Minnesota	85	83
Mississippi	2	4
Missouri	9	13
Nebraska	0	1
New Hampshire	39	39
New Jersey	10	17
New York	33	35
North Carolina	7	10
North Dakota	0	0
Ohio	9	13
Oklahoma	0	1
Pennsylvania	28	30
Rhode Island	2	2
South Carolina	5	9
Tennessee	1	1
Texas	2	6
Vermont	33	33
Virginia	20	24
West Virginia	5	9
Wisconsin	134	145
Total	**756**	**943**

Table 4. Number of woodcock wings received from hunters, and indices of recruitment in the U.S. Recruitment indices for individual states with ≥125 submitted wings were calculated as the ratio of immatures per adult female. The regional indices for 2023 were weighted by the relative contribution of each state to the cumulative number of adult female and immature wings received during 1963–2022.

State or Region of harvest	Total Wings 1963-2022	Total Wings 2023	Adult Female Wings 1963-2022	Adult Female Wings 2023	Immature Wings 1963-2022	Immature Wings 2023	Recruitment Index 1963-2022	Recruitment Index 2023
CT	16,105	148	3,630	31	9,778	84	2.70	2.71
DE	668	67	111	12	449	42	4.15	----
FL	678	0	153	0	422	0	2.76	----
GA	3,500	57	1,104	24	1,473	23	1.34	----
ME	95,007	594	28,177	195	47,350	258	1.69	1.32
MD	5,289	59	1,296	17	3,009	36	2.34	----
MA	26,684	271	8,378	105	12,873	124	1.55	1.18
NH	40,415	347	13,140	124	18,713	153	1.44	1.23
NJ	28,393	160	6,566	40	16,791	104	2.56	2.60
NY	67,876	272	23,113	95	30,470	110	1.32	1.16
NC	5,094	129	1,664	46	2,348	48	1.43	1.04
PA	35,315	196	11,237	68	16,270	87	1.45	1.28
RI	2,511	2	488	0	1,660	2	3.41	----
SC	4,866	116	1,573	42	2,169	41	1.40	----
VT	31,763	306	10,460	72	14,408	172	1.39	2.39
VA	7,713	309	2,053	103	4,138	135	2.06	1.31
WV	6,825	16	2,072	5	3,390	7	1.64	----
Eastern Region	**378,702**	**3,049**	**115,215**	**979**	**185,711**	**1,426**	**1.61**	**1.53**
AL	1,112	3	326	1	491	0	1.51	----
AR	618	11	202	4	252	4	1.25	----
IL	1,521	0	359	0	851	0	2.37	----
IN	9,161	84	2,357	37	5,040	26	2.14	----
IA	1,425	10	459	5	640	5	1.39	----
KS	50	6	9	2	26	1		----
KY	1,399	25	357	7	702	12	1.97	----
LA	34,786	187	7,854	61	22,415	91	2.85	1.49
MI	156,576	2,435	51,726	829	76,085	1,168	1.47	1.41
MN	51,876	845	18,695	349	21,983	320	1.18	0.92
MS	2,041	20	576	3	1,029	13	1.79	----
MO	5,027	93	1,375	40	2,426	36	1.76	----
NE	13	8	5	3	6	4	----	----
ND	4	0	3	0	1	0	----	----
OH	15,917	74	4,897	33	7,484	18	1.53	----
OK	178	1	39	1	94	0	2.41	----
TN	1,403	10	378	6	708	3	1.87	----
TX	1,211	150	363	55	581	52	1.60	0.95
WI	107,020	1,553	36,775	623	49,701	604	1.35	0.97
Central Region	**391,338**	**5,515**	**126,755**	**2,059**	**190,515**	**2,357**	**1.48**	**1.18**

Table 5. Preliminary estimates of woodcock harvest, hunter numbers, days afield, and hunter success from the 2023–2024 Harvest Information Program (note: estimates rounded to the nearest 100 for harvest, hunters, and days afield).

State or Region	Harvest	Harvest SE	Active Woodcock Hunters	Active Woodcock Hunters SE	Days Afield	Days Afield SE	Season Harvest Per Hunter	Season Harvest Per Hunter SE
CT	1,000	300	200	<100	1,800	300	4.14	1.26
DE	600	300	<100	<100	300	100	12.50	7.72
FL	100	100	7,800	5,200	16,900	11,900	0.02	0.02
GA	4,000	900	700	100	4,900	900	5.80	1.38
MA	4,900	2,800	4,700	2,000	25,600	12,000	1.05	0.75
MD	1,300	400	3,500	3,100	4,700	3,200	0.38	0.36
ME	20,500	6,700	8,100	3,000	27,600	6,700	2.52	1.24
NC	9,000	3,100	10,200	5,000	23,200	9,600	0.89	0.53
NH	4,500	400	1,100	0	7,600	500	4.20	0.40
NJ	8,300	6,500	4,600	2,700	32,000	21,600	1.80	1.75
NY	5,800	2,800	6,300	3,700	46,700	29,300	0.91	0.69
PA	5,000	500	3,700	1,900	27,600	15,100	1.33	0.69
RI	<100	<100	100	<100	700	200	0.29	0.28
SC	3,300	600	600	<100	3,400	400	5.81	1.07
VA	4,200	600	700	<100	3,800	400	6.21	0.97
VT	5,500	2,100	2,600	2,000	10,800	6,100	2.10	1.80
WV	500	100	100	<100	900	200	3.77	0.82
Eastern Region	**78,700**	**10,900**	**55,000**	**na[a]**	**238,400**	**45,000**	**na[b]**	**na[b]**
AL	5,800	5,500	2,000	1,800	8,300	7,300	2.90	3.80
AR	17,400	15,400	3,400	2,200	6,500	3,500	5.14	5.64
IA	800	600	1,300	1,100	6,300	5,400	0.66	0.75
IL	200	100	100	<100	500	200	1.63	0.96
IN	600	200	200	<100	800	200	3.79	1.33
KS	100	<100	<100	<100	100	100	2.50	2.87
KY	800	300	200	<100	1,000	200	4.30	1.60
LA	13,500	3,600	6,800	2,700	14,600	3,700	1.97	0.93
MI	50,400	6,600	26,600	5,200	109,400	18,100	1.89	0.45
MN	30,300	5,100	15,500	4,800	69,500	25,200	1.95	0.69
MO	1,300	400	300	<100	1,500	300	4.90	1.53
MS	600	100	300	<100	1,500	400	1.90	0.51
NE	100	<100	100	<100	700	300	0.71	0.45
OH	1,300	200	2,400	1,900	6,200	3,800	0.53	0.43
OK	300	300	100	<100	300	200	5.00	5.94
TN	2,400	800	2,900	2,600	28,400	26,000	0.84	0.80
TX	2,700	700	400	<100	1,900	400	6.96	1.94
WI	32,000	3,500	18,800	4,300	95,900	24,800	1.70	0.43
Central Region	**160,500**	**19,200**	**81,400**	**na[a]**	**353,400**	**48,900**	**na[b]**	**na[b]**
U.S. Total	**239,200**	**22,000**	**136,400**	**na[a]**	**591,800**	**66,400**	**na[b]**	**na[b]**

[a]Hunter number estimates at the regional and national levels may be biased high because the HIP sample frames are state specific; therefore, hunters were counted more than once if they hunted in >1 state. Variance was inestimable.

[b] Regional estimates of hunter success could not be obtained due to the occurrence of individual hunters being registered in the Harvest Information Program in more than 1 state.

Appendix A. History of federal framework dates, season lengths, and daily bag limits for hunting American woodcock in the U.S. portion of the Eastern and Central Regions, 1918 – 2024.

Eastern Year(s)	Eastern Outside Dates	Eastern Season Length	Eastern Daily Bag Limit	Central Year(s)	Central Outside Dates	Central Season Length	Central Daily Bag Limit
1918-26	Oct. 1 - Dec. 31	60	6	1918-26	Oct. 1 - Dec. 31	60	6
1927	Oct. 1 - Dec. 31	60	4	1927	Oct. 1 - Dec. 31	60	4
1928-39	Oct. 1 - Dec. 31	30	4	1928-39	Oct. 1 - Dec. 31	30	4
1940-47	Oct. 1 - Jan. 6	15	4	1940-47	Oct. 1 - Jan. 6	15	4
1948-52	Oct. 1 - Jan. 20	30	4	1948-52	Oct. 1 - Jan. 20	30	4
1953	Oct. 1 - Jan. 20	40	4	1953	Oct. 1 - Jan. 20	40	4
1954	Oct. 1 - Jan. 10	40	4	1954	Oct. 1 - Jan. 10	40	4
1955-57	Oct. 1 - Jan. 20	40	4	1955-57	Oct. 1 - Jan. 20	40	4
1958-60	Oct. 1 - Jan. 15	40	4	1958-60	Oct. 1 - Jan. 15	40	4
1961-62	Sep. 1 - Jan. 15	40	4	1961-62	Sep. 1 - Jan. 15	40	4
1963-64	Sep. 1 - Jan. 15	50	5	1963-64	Sep. 1 - Jan. 15	50	5
1965-66	Sep. 1 - Jan. 30	50	5	1965-66	Sep. 1 - Jan. 30	50	5
1967-69	Sep. 1 - Jan. 31	65	5	1967-69	Sep. 1 - Jan. 31	65	5
1970-71	Sep. 1 - Feb. 15	65	5	1970-71	Sep. 1 - Feb. 15	65	5
1972-81	Sep. 1 - Feb. 28	65	5	1972-90	Sep. 1 - Feb. 28	65	5
1982	Oct. 5 - Feb. 28	65	5	1991-96	Sep. 1 - Jan. 31	65	5
1983-84	Oct. 1 - Feb. 28	65	5	1997-20	Sep. 22[a] - Jan. 31	45	3
1985-96	Oct. 1 - Jan. 31	45	3	2021-24	Sep. 13 - Jan 31	45	3
1997-01	Oct. 6 - Jan. 31	30	3				
2002-10	Oct. 1 - Jan. 31	30	3				
2011-20	Oct. 1 - Jan. 31	45	3				
2021-24	Sep. 13 - Jan 31	45	3				

[a] Saturday nearest September 22nd.

Appendix B. Estimates for the number of successful woodcock hunters and woodcock harvest in Canada (Gendron and Smith 2024).

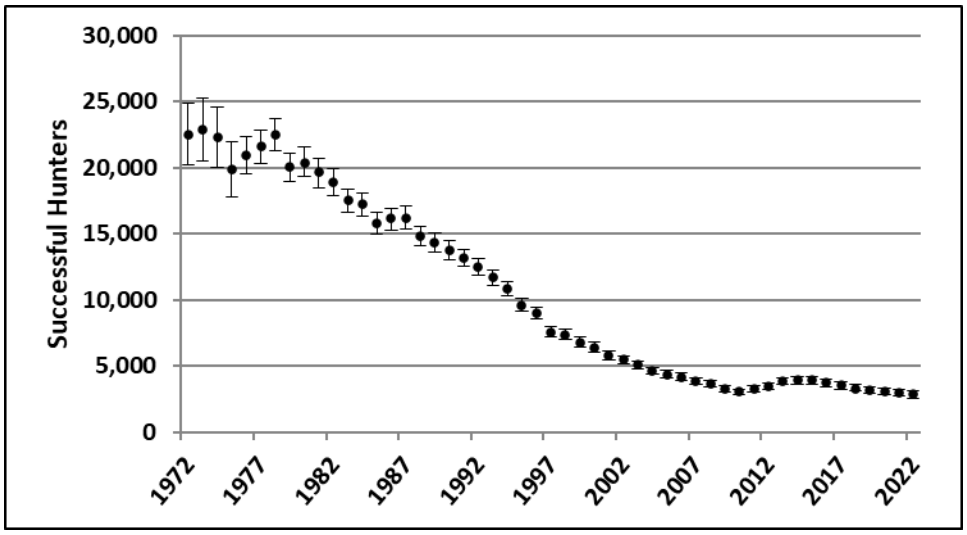

Figure B1. Estimated number of successful woodcock hunters in Canada and associated 95% confidence intervals, 1972–2022.

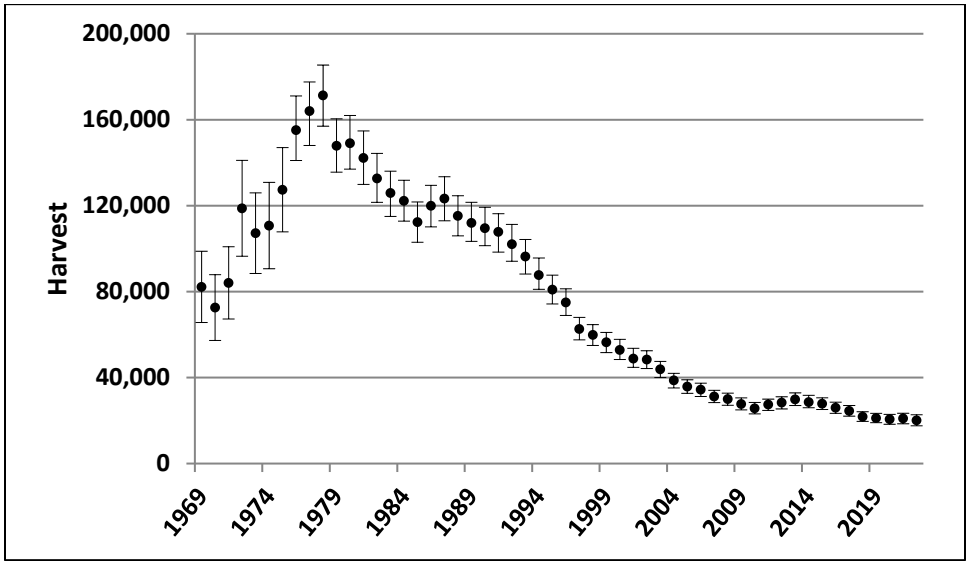

Figure B2. Estimated woodcock harvest in Canada and associated 95% confidence intervals, 1969–2022.

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