



## 2023 MINNESOTA SHARP-TAILED GROUSE SURVEY

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### SUMMARY OF FINDINGS

The Minnesota DNR coordinates sharp-tailed grouse (*Tympanuchus phasianellus*) surveys each spring with the help of wildlife staff and cooperating biologists in the Northwest (NW) and East-Central (EC) survey regions. Sharp-tailed grouse surveys were conducted between 20 March and 13 May 2023, with 1,777 birds (males and birds of unknown sex) observed at 154 leks. Additionally, 2 birds were observed at 1 lek in southwestern Minnesota. The mean numbers of sharp-tailed grouse/lek were 8.0 (6.3 – 9.9) in the EC survey region, 12.4 (11.1 – 13.8) in the NW region, and 11.5 (10.4 – 12.7) statewide (EC and NW combined). Comparisons between leks observed in both 2022 and 2023 indicated similar numbers of birds/lek were observed in the EC region ( $t = 0.38$ ,  $P = 0.71$ ), in the NW region ( $t = 0.19$ ,  $P = 0.85$ ), and statewide ( $t = 0.08$ ,  $P = 0.93$ ). The number of leks in the EC region remains low ( $n = 31$ ) compared to the 70 leks counted as recently as 2010. Small populations are vulnerable to stochastic events like catastrophic storms, extreme flooding, and disease outbreaks.

### INTRODUCTION

The Minnesota DNR coordinates grouse surveys each year to monitor changes in grouse populations through time. These surveys provide a reasonable index to population trends when the primary source of variation in counts among years is change in densities. However, weather, habitat conditions, observer ability, and grouse behavior also vary over time and can influence survey counts. Thus, making inferences from survey data over short time periods (e.g., a few years) can be tenuous. Nevertheless, over longer time periods and when large changes in index values occur, these surveys can provide a reasonable index to long-term grouse population trends.

The first surveys of sharp-tailed grouse (*Tympanuchus phasianellus*) in Minnesota occurred between the early-1940s and 1960. The current survey is based on counts at dancing grounds during the spring and was first conducted in 1976. Male sharp-tailed grouse display, or dance, together in open areas to attract females in the spring. This display consists of the males stomping their feet with out-stretched wings. Females visit the dancing grounds to select males for breeding. These dancing grounds, or leks, are reasonably stable in location from year to year, allowing surveyors to visit and count individuals each spring. Staff and cooperators conduct surveys in openland portions of the state where sharp-tailed grouse persist, although sharp-tailed grouse were formerly much more widely distributed in Minnesota at the early part of the 20<sup>th</sup> century. In recent years, sharp-tailed grouse have reportedly been expanding

southward into the range of the Greater Prairie-chicken (*Tympanuchus cupido*) in western Minnesota but have been declining in the east-central part of the state.

Sharp-tailed grouse are popular among hunters. Annual harvest has been 5,000 – 22,000 birds since the early-1990s, with 4,000 – 10,000 hunters in Minnesota. However, the hunting season was closed in the East-Central (EC) region beginning in 2021 due to concerns about the population decline in this region and challenges to implementing a hunting season with remaining leks concentrated primarily in the Aitkin Wildlife area.

## **METHODS**

Wildlife staff and volunteers survey known sharp-tailed grouse lek locations in the Northwest (NW) and EC portions of the state (Figure 1) during the peak in lek attendance, which usually occurs in the latter half of April and the first week of May. The NW survey region consists of Lake Agassiz & Aspen Parklands, Northern Minnesota & Ontario Peatlands, and Red River Valley Sections of the Ecological Classification System (ECS). The EC survey region consists of selected subsections of the Northern Minnesota Drift & Lake Plains, Western Superior Uplands, and Southern Superior Uplands sections. In the EC region, and in eastern portions of the NW region where sharp-tailed grouse occur at low densities, most known leks are surveyed each year. Some leks may have been missed, but most managers in these regions believe that they include most of the leks in their work area, with the exception of Aitkin and Tower work areas where workloads have not permitted exhaustive surveys. In the western part of the NW region, sharp-tailed grouse occur at higher densities, and thus surveying all leks is not feasible. Therefore, in the western portion of the NW region (e.g., Roseau, Thief River Falls), managers conduct surveys along 20- to 25-mile (32- to 40-km) routes. Given the uncertainty in the proportion of leks missed, especially those occurring outside traditional areas, the survey does not reflect sharp-tailed grouse numbers in larger areas such as counties or regions.

Each cooperator was provided with instructions and asked to conduct surveys on  $\geq 1$  day in an attempt to obtain a maximum count of male sharp-tailed grouse attendance at each lek. Observers were asked to conduct surveys within 2.5 hours of sunrise under clear skies and during low winds (<16 km/hr, or <10 mph) when lek attendance and ability to detect leks were expected to be greatest. Data recorded during each lek visit included the number of males, females, and birds of unknown sex. Observed lek size can vary as a function of population changes, lek numbers, and the timing, effort, and conditions of surveys, so it is important to consider all these factors when collecting data.

The number of sharp-tailed grouse per dancing ground was used as the index value and was averaged for the NW region, the EC region, and statewide, using known males and birds of unknown sex. Observations of just 1 grouse were not included in the index. Data from former survey years were available for comparison, however, survey effort and success varied among years, rendering comparisons of the full survey among years invalid. Therefore, to make valid comparisons between 2 consecutive years, only counts of birds from dancing grounds that were surveyed during both years were considered. Paired t-tests were used to test the significance of comparisons among years. Confidence intervals (95%) were calculated using 10,000 bootstrap samples of lek counts for each region and statewide.

Beginning in 2022, the Minnesota Sharp-tailed Grouse Society (MSGs) has been leading an independent citizen volunteer effort to search for sharp-tailed grouse in southwestern Minnesota. I included their findings in this report to document the presence of lek activity outside the traditional survey region.

## RESULTS & DISCUSSION

A total of 1,777 male sharp-tailed grouse and grouse of unknown sex were counted statewide at 155 leks, including 2 birds at 1 lek found in Lac Qui Parle County by MSGS volunteers (Table 1). Surveys were conducted during 20 March to 13 May 2023. Leks with  $\geq 2$  grouse were observed an average of 1.5 times. The statewide index value of 11.5 (10.4 – 12.7) grouse/lek was centrally located among values observed since 1980 (Figure 2) and leks observed statewide in 2022 and 2023 were similar ( $t = 0.08$ ,  $P = 0.93$ ).

In the EC survey region, 247 sharp-tailed grouse were counted on 31 leks in 2023, which was an 87% increase from the 132 birds counted on 18 leks in 2021 that prompted the close of the hunting season in this region. Birds and leks declined sharply in this region in the 2021 survey compared to 2019 (surveys were not conducted in 2020 during the Governor's Stay at Home Order), when 216 grouse were counted on 30 leks (Figure 3). The grouse/lek index in the EC region was similar (8.0, CI: 6.3 – 9.9) to last year, and counts at leks surveyed in both 2022 and 2023 were also similar ( $t = 0.4$ ,  $P = 0.71$ ; Table 2). However, the distribution and number of leks in the EC region is localized and small. Most (77%) leks reported in the EC region were in the Aitkin Wildlife work area, and 9 of the 10 additional leks counted in the EC region this year resulted from greater survey effort in the Aitkin work area. No leks were reported in the Cambridge work area, and this has been the case since 2018, despite fairly consistent survey effort. The Tower work area reported 3 leks in 2022 and 2023 in contrast to 2021 when none were observed. Five birds were reported at St. Croix State Park, which is the second year that birds have been at the park in the spring, with 2 additional leks observed in the Cloquet work area. These survey data, in combination with studies indicating a genetic population bottleneck in the EC region (Roy and Gregory, 2019) and reporting inconsistent lek attendance (Roy and Coy, 2021), support the conclusion that birds in the EC region are exhibiting traits of a population in decline and may be vulnerable to stochasticity among years. Moreover, the increase in leks counted in the EC region this year illustrates how changes in survey effort can influence the number of leks observed in the annual survey.

In the NW survey region, 1,528 grouse were counted on 123 leks with 12.4 (11.1 – 13.8) grouse/lek. Fewer leks were observed in 2023 than 2022 (123 compared to 142), in part due to continuing staff vacancies in at least one work area, again reflecting the importance of consistent survey effort in population monitoring (Figure 3). Counts at leks that were observed during both 2022 and 2023 were similar in the NW survey region ( $t = 0.19$ ,  $P = 0.85$ ). Thus, sharp-tailed grouse appear to be stable in the NW region, although they may be increasing in some parts of the region and declining in others. For example, biologists in the greater prairie-chicken survey regions (the southern part of the NW survey region for sharp-tailed grouse) recently have reported more sharp-tailed grouse in areas that used to hold primarily greater prairie-chickens. However, reports of sharp-tailed grouse observed during prairie-chicken surveys were not included in this report because data were incomplete at the time of report writing. Nevertheless, this report provides an index of sharp-tailed grouse in the traditionally surveyed regions. Range shifts to new areas are not easily detected with these methods, but if survey effort expands and is consistent each year, new areas could be incorporated into this report in the future.

## ACKNOWLEDGEMENTS

Annual sharp-tailed grouse surveys were accomplished through the efforts of staff and volunteers at Aitkin, Baudette, Bemidji, Cambridge, Cloquet, Grand Rapids, Karlstad, Red Lake WMA, Roseau River WMA, Thief Lake WMA, Thief River Falls, and Tower work areas. Cooperators from Agassiz and Glacial Ridge National Wildlife Refuges also participated. In

2022, the Minnesota Sharp-tailed Grouse Society initiated an effort to survey southwestern Minnesota for sharp-tailed grouse leks and submitted data for state records. Dave Pauly also completed surveys in the Cambridge work area and at St. Croix State Park. Mike Larson reviewed this report. This work was funded in part through the Federal Aid in Wildlife Restoration Act.

## References

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Table 1. Sharp-tailed grouse / lek ( $\geq 2$  males) at leks observed during spring surveys each year in the Northwest and East Central regions in Minnesota.

Year	Statewide			Northwest <sup>a</sup>			East Central <sup>a</sup>		
	Mean	95% CI <sup>b</sup>	<i>n</i> <sup>c</sup>	Mean	95% CI <sup>b</sup>	<i>n</i> <sup>c</sup>	Mean	95% CI <sup>b</sup>	<i>n</i> <sup>c</sup>
2004	11.2	10.1 – 12.3	183	12.7	11.3 – 14.2	116	8.5	7.2 – 9.9	67
2005	11.3	10.2 – 12.5	161	13.1	11.5 – 14.7	95	8.8	7.3 – 10.2	66
2006	9.2	8.3 – 10.1	161	9.8	8.7 – 11.1	97	8.2	6.9 – 9.7	64
2007	11.6	10.5 – 12.8	188	12.7	11.3 – 14.1	128	9.4	8.0 – 11.0	60
2008	12.4	11.2 – 13.7	192	13.6	12.0 – 15.3	122	10.4	8.7 – 12.3	70
2009	13.6	12.2 – 15.1	199	15.2	13.4 – 17.0	137	10.0	8.5 – 11.7	62
2010	10.7	9.8 – 11.7	202	11.7	10.5 – 12.9	132	8.9	7.5 – 10.5	70
2011	10.2	9.5 – 11.1	216	11.2	10.2 – 12.2	156	7.8	6.7 – 8.9	60
2012	9.2	8.2 – 10.3	153	10.7	9.3 – 12.3	100	6.3	5.4 – 7.3	53
2013	9.2	8.2 – 10.2	139	10.5	9.3 – 11.7	107	4.8	3.8 – 5.9	32
2014	9.8	8.8 – 10.9	181	10.9	9.8 – 12.1	144	5.4	4.5 – 6.4	37
2015	9.8	8.9 – 10.7	206	10.8	9.9 – 11.9	167	5.3	4.4 – 6.4	39
2016	9.5	8.6 – 10.5	182	10.2	9.2 – 11.4	152	6.0	4.9 – 7.3	30
2017	9.7	8.7 – 10.8	181	10.4	9.2 – 11.8	141	7.2	5.8 – 8.6	40
2018	9.3	8.4 – 10.3	161 <sup>d</sup>	9.8	8.8 – 10.9	130	7.3	5.4 – 9.6	30
2019	10.2	9.1 – 11.4	152	11.0	9.7 – 12.3	122	7.2	5.4 – 9.5	30
2020	NA <sup>e</sup>	NA	NA	NA	NA	NA	NA	NA	NA
2021	10.8	9.7 – 11.9	150 <sup>d</sup>	11.3	10.1 – 12.5	131	7.3	5.1 – 9.8	18
2022	12.2	11.0 – 13.4	163	12.5	11.2 – 13.9	142	9.8	7.0 – 13.0	21
2023	11.5	10.4 – 12.7	154	12.4	11.1 – 13.8	123	8.0	6.3 – 9.9	31

<sup>a</sup> Survey regions; see Figure 1.

<sup>b</sup> 95% CI = 95% confidence interval

<sup>c</sup> *n* = number of leks in the sample.

<sup>d</sup> One lek was located just south of the NW region in Clearwater County.

<sup>e</sup> No data were collected in 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic.

Table 2. Difference in the number of sharp-tailed grouse / lek observed during spring surveys of the same lek in consecutive years in Minnesota.

Comparison <sup>b</sup>	Statewide			Northwest <sup>a</sup>			East Central <sup>a</sup>		
	Mean	95% CI <sup>c</sup>	<i>n</i> <sup>d</sup>	Mean	95% CI <sup>c</sup>	<i>n</i> <sup>d</sup>	Mean	95% CI <sup>c</sup>	<i>n</i> <sup>d</sup>
2004 – 2005	-1.3	-2.2 – -0.3	186	-2.1	-3.5 – -0.8	112	0.0	-1.0 – 1.1	74
2005 – 2006	-2.5	-3.7 – -1.3	126	-3.6	-5.3 – -1.9	70	-1.1	-2.6 – 0.6	56
2006 – 2007	2.6	1.5 – 3.8	152	3.3	1.7 – 5.1	99	1.2	0.1 – 2.3	53
2007 – 2008	0.4	-0.8 – 1.5	166	0.0	-1.6 – 1.6	115	1.2	0.1 – 2.5	51
2008 – 2009	0.9	-0.4 – 2.3	181	1.8	-0.1 – 3.8	120	-0.8	-2.1 – 0.6	61
2009 – 2010	-0.6	-1.8 – 0.6	179	-0.8	-2.6 – 1.0	118	-0.1	-1.2 – 1.0	61
2010 – 2011	-1.7	-2.7 – -0.8	183	-1.8	-3.1 – -0.5	124	-1.5	-2.8 – -0.3	59
2011 – 2012	-2.0	-2.9 – -1.1	170	-1.7	-2.9 – -0.4	112	-2.4	-3.3 – -1.6	58
2012 – 2013	-0.8	-2.0 – 0.4	140	0.4	-1.3 – 2.3	88	-2.9	-4.2 – -1.8	52
2013 – 2014	1.4	0.1 – 2.7	121	1.6	-0.3 – 3.5	79	1.1	-0.1 – 2.3	42
2014 – 2015	-0.2	-1.4 – 0.9	141	-0.3	-1.9 – 1.3	102	-0.1	-1.1 – 1.1	39
2015 – 2016	-1.3	-2.3 – -0.2	167	-1.6	-2.9 – -0.2	129	-0.2	-1.3 – 0.9	38
2016 – 2017	-0.3	-1.5 – 0.9	166	-0.3	-1.8 – 1.2	128	-0.2	-1.2 – 0.8	38
2017 – 2018	-2.2	-3.3 – -1.1	159 <sup>e</sup>	-2.4	-3.9 – -0.4	123	-1.4	-2.8 – 0.2	36
2018 – 2019	-0.3	-1.5 – 1.0	132	0.0	-1.5 – 1.6	101	-1.4	-3.0 – 0.1	31
2019 – 2020 <sup>f</sup>	NA	NA	NA	NA	NA	NA	NA	NA	NA
2019 – 2021 <sup>g</sup>	-0.7	-2.2 – 0.7	124	-0.5	-2.3 – 1.3	96	-1.6	-2.9 – -0.3	28
2021 – 2022	1.6	0.2 – 3.0	122	1.3	-0.3 – 3.0	96	2.7	0.5 – 5.0	26
2022 – 2023	0.7	-1.6 – 1.7	127	0.19	-1.7 – 2.1	106	-0.5	-3.4 – 1.9	21

<sup>a</sup> Survey regions; see Figure 1.

<sup>b</sup> Consecutive years for which comparable leks were compared.

<sup>c</sup> 95% CI = 95% confidence interval

<sup>d</sup> *n* = number of leks in the sample. Here, a lek can have a 0 count in 1 of the 2 years and still be considered.

<sup>e</sup> One lek was located just south of the NW region in Clearwater County.

<sup>f</sup> No data were collected in 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic.

<sup>g</sup> Comparisons were made between 2019 and 2021 because the survey was not conducted in 2020.

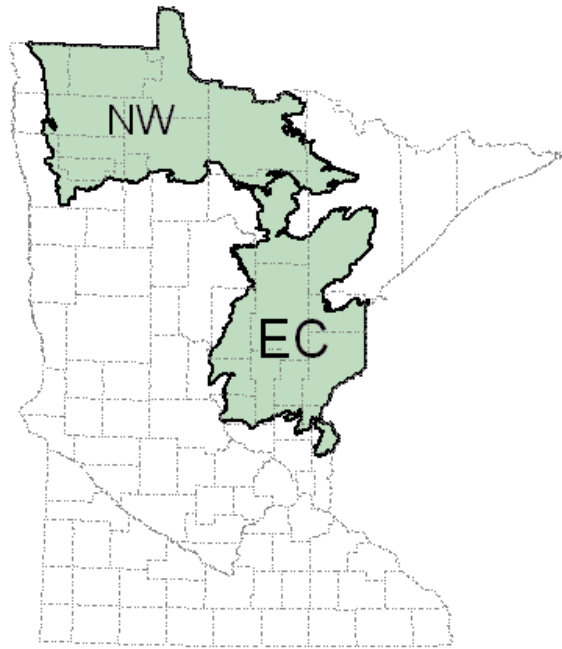


Figure 1. Survey regions for **sharp-tailed grouse** in Minnesota. Northwest (NW) and East Central (EC) survey regions are depicted relative to county boundaries (dashed lines) and influenced by Ecological Classification System Subsection boundaries.

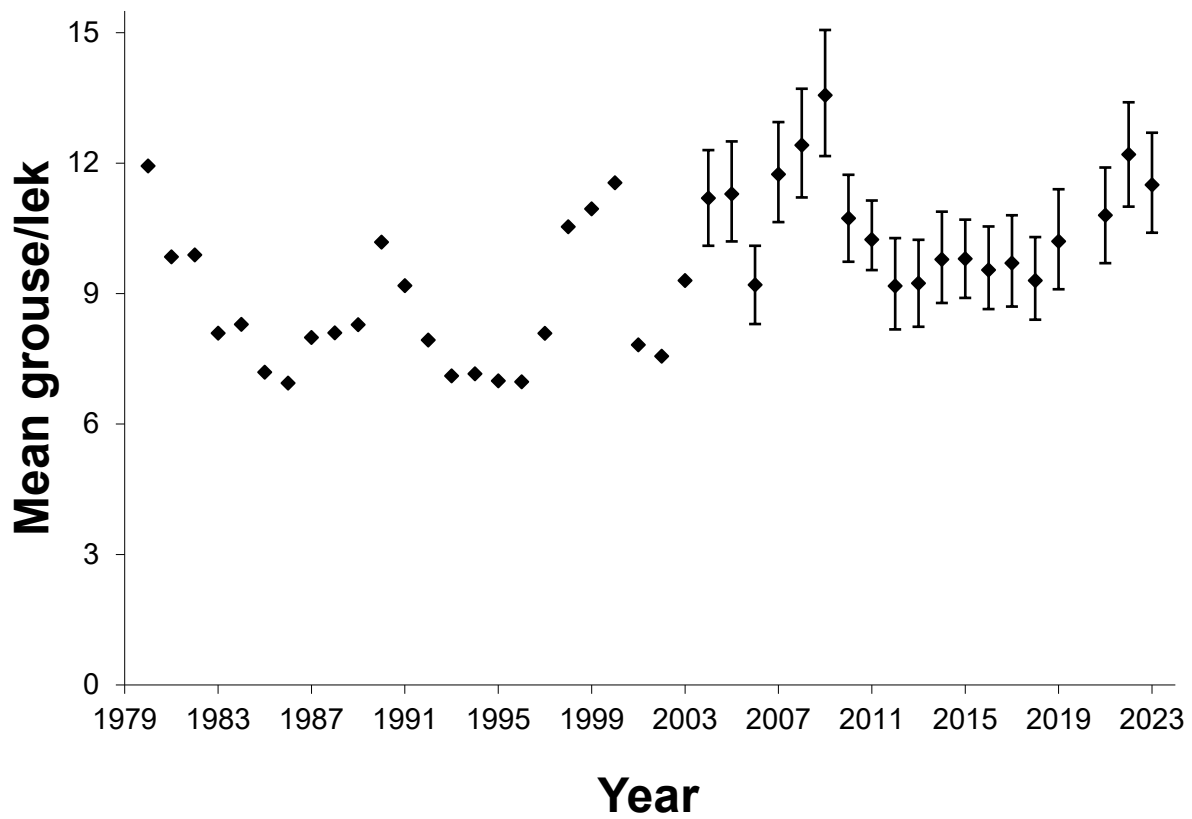


Figure 2. **Sharp-tailed grouse** counted in spring lek surveys statewide in Minnesota during 1980–2023. Bootstrap (95%) confidence intervals are provided for recent years. Annual means are not connected by lines because the same leks were not surveyed every year. No data were collected in 2020 due to the Governor’s Stay at Home Order during the COVID-19 pandemic.

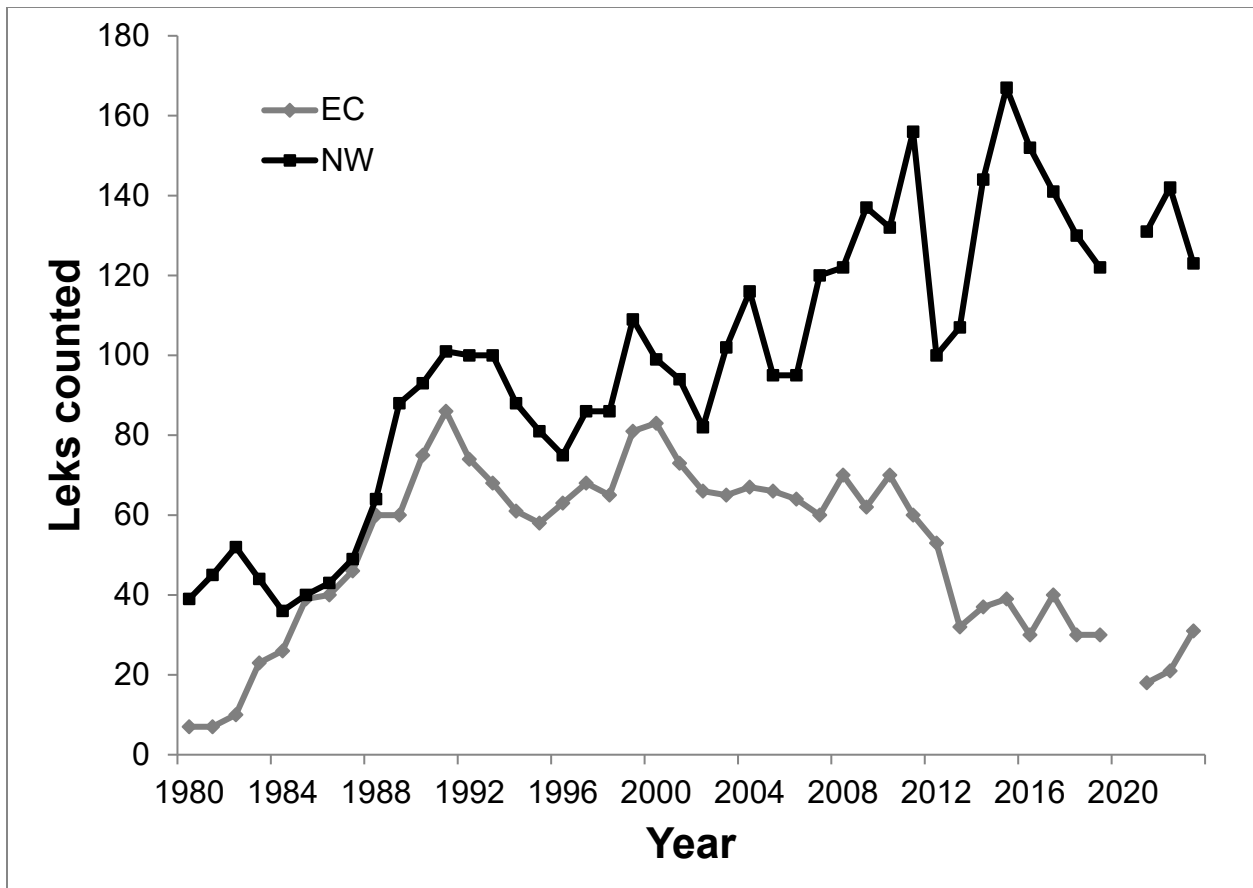


Figure 3. The number of **sharp-tailed grouse** leks with 2 or more birds counted in spring lek surveys in the Northwest (NW) and East Central (EC) survey regions of Minnesota during 1980 – 2023. Survey data were not collected in 2020 due to the Governor’s Stay at Home Order during the COVID-19 pandemic.