2021 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. DNR Wildlife Staff did not conduct sharp-tailed grouse surveys during 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic. Therefore, I compared survey data from 2021 to that from 2019. Sharp-tailed grouse surveys were conducted between 10 March and 19 May 2021, with 1,614 birds (males and birds of unknown sex) observed at 150 leks. The mean numbers of sharp-tailed grouse/lek were 7.3 (5.5 – 9.8) in the East Central (EC) survey region, 11.3 (10.1 – 12.5) in the Northwest (NW) region, and 10.8 (9.7 – 11.9) statewide. Comparisons between leks observed in both 2019 and 2021 indicated similar numbers of birds/lek statewide ($t = 1.0$, $P = 0.34$) and in the NW region ($t = 0.50$, $P = 0.62$, $n = 96$). However, in the EC region, birds/lek decreased 32% in 2021 ($t = 2.2$, $P = 0.04$, $n = 28$) and the number of leks with $\geq$2 birds dropped from 30 in 2019 to 18 in 2021. These changes in the EC region, in the absence of changes in survey effort in this region, are indicative of a population in steep decline.

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 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 20th 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 (*Tympanuchus phasianellus*) are popular among hunters. Annual harvest is 5,000 – 22,000 birds since the early-1990s, with 4,000 – 10,000 hunters in Minnesota.

METHODS

Wildlife staff and volunteers survey known sharp-tailed grouse lek locations in the Northwest (NW) and East Central (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 region consists of Lake Agassiz & Aspen Parklands, Northern Minnesota & Ontario Peatlands, and Red River Valley Ecological Classification Sections (ECS). The EC 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 do not permit 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 20-25 mile (32-40 km) routes. Given the uncertainty in the proportion of leks missed, especially those occurring outside traditional areas, the survey may not necessarily 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.

During the COVID-19 pandemic in spring 2020, DNR Wildlife Staff did not conduct any sharp-tailed grouse surveys during the peak in lek attendance. Unlike ruffed grouse surveys, few external cooperators participate in sharp-tailed grouse surveys. Thus, data were not reported for 2020. For this report, I made comparisons between the 2021 survey data and data collected in 2019.

RESULTS & DISCUSSION

A total of 1,614 male sharp-tailed grouse and grouse of unknown sex were counted statewide at 150 leks, including 1 lek outside the survey regions (Table 1), during 10 March to 19 May 2021. Leks with ≥2 grouse were observed an average of 1.8 times. The statewide index value of 10.8 (9.1 – 11.4) grouse/lek was centrally located among values observed since 1980 (Figure 2). In the NW survey region, 1,479 grouse were counted on 131 leks with 11.3 (10.1 – 12.5) grouse/lek, which is similar to 2019, despite staff vacancies preventing a complete survey in the International Falls area. Counts at leks that were observed during both 2019 and 2021 were similar statewide ($t = 1.0$, $P = 0.34$) and in the NW survey region ($t = 0.50$, $P = 0.62$). Thus, sharp-tailed grouse appear to be stable or possibly increasing in the NW region. Consistent with this, biologists in the Greater Prairie-chicken survey regions (the southern part of the NW survey region) are reporting more sharp-tailed grouse in areas that used to hold Greater Prairie-chickens.

In contrast to the NW survey region, in the EC survey region, counts at leks surveyed in both 2019 and 2021 declined by 32% ($t = 2.2$, $P = 0.04$; Table 2). Likewise, in the EC survey region, 132 grouse were counted on 18 leks, which is substantially lower than in 2019 when a similar survey effort resulted in 216 grouse being counted on 30 leks (Figure 3). Fourteen of the 18 leks reported were in the Aitkin work area, with no leks reported in the Tower or Cambridge work areas, despite surveys in these areas. This is the first year that Tower work area has reported no birds in the survey. Cambridge work area first reported no birds in the survey in 2018. Despite the loss of nearly half the leks, the grouse/lek index was similar 7.3 (5.1- 9.8) to 2019. When populations decline, small leks can disappear or they can combine with other leks, which can increase the grouse/lek index initially. Here, however, the number of birds counted also went down, and the grouse/lek index did not change. These data, in combination with studies indicating a genetic population bottleneck in this region (Roy and Gregory 2019) and reporting inconsistent lek attendance (Roy and Coy, in review), support the conclusion that this population is exhibiting traits of a population in steep decline.

ACKNOWLEDGEMENTS

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References

Roy, C. L., and A. J. Gregory. 2019. Landscape and population genetics reveal long-distance Sharp-tailed Grouse (*Tympanuchus phasianellus*) movements and a recent bottleneck in Minnesota. Conservation Genetics 20:259-273 https://doi.org/10.1007/s10592-018-1128-x

Roy, C. L., and P. Coy. In review. Lek attendance and disturbance at viewing blinds in a small, declining Sharp-tailed Grouse population.

Table 1. Sharp-tailed grouse / lek (≥2 males) at all leks observed during spring surveys each year in Minnesota.

	Statewide			Northwest[a]			East Central[a]		
Year	Mean	95% CI[b]	*n*[c]	Mean	95% CI[b]	*n*[c]	Mean	95% CI[b]	*n*[c]
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[d]	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[e]	NA	NA	NA	NA	NA	NA	NA	NA
2021	10.8	9.7 – 11.9	150[d]	11.3	10.1 – 12.5	131	7.3	5.1 – 9.8	18

[a] Survey regions; see Figure 1.
[b] 95% CI = 95% confidence interval
[c] *n* = number of leks in the sample.
[d]One lek was located just south of the NW region in Clearwater County.
[e]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.

	Statewide			Northwest[a]			East Central[a]		
Comparison[b]	Mean	95% CI[c]	*n*[d]	Mean	95% CI[c]	*n*[d]	Mean	95% CI[c]	*n*[d]
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[e]	-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[f]	NA	NA	NA	NA	NA	NA	NA	NA	NA
2019 – 2021[g]	-0.7	-2.2 – 0.7	124	-0.5	-2.3 – 1.3	96	-1.6	-2.9 – -0.3	28

[a] Survey regions; see Figure 1.
[b] Consecutive years for which comparable leks were compared.
[c] 95% CI = 95% confidence interval
[d] *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.
[e]One lek was located just south of the NW region in Clearwater County.
[f]No data were collected in 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic.
[g]Comparisons were made between 2019 and 2021 because the survey was not conducted in 2020.

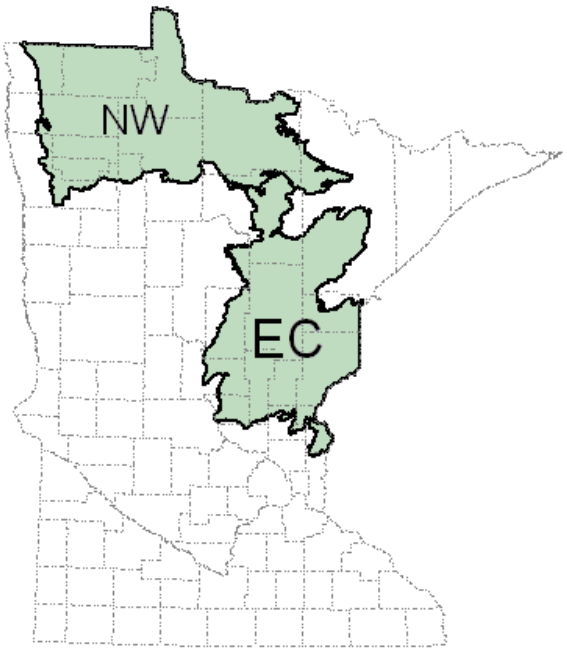

Figure 1. Survey regions for **sharp-tailed grouse** in Minnesota. Northwest (NW) and East Central (EC) survey regions are depicted relative to county boundaries (dashed lines) and influenced by Ecological Classification System Subsections boundaries.

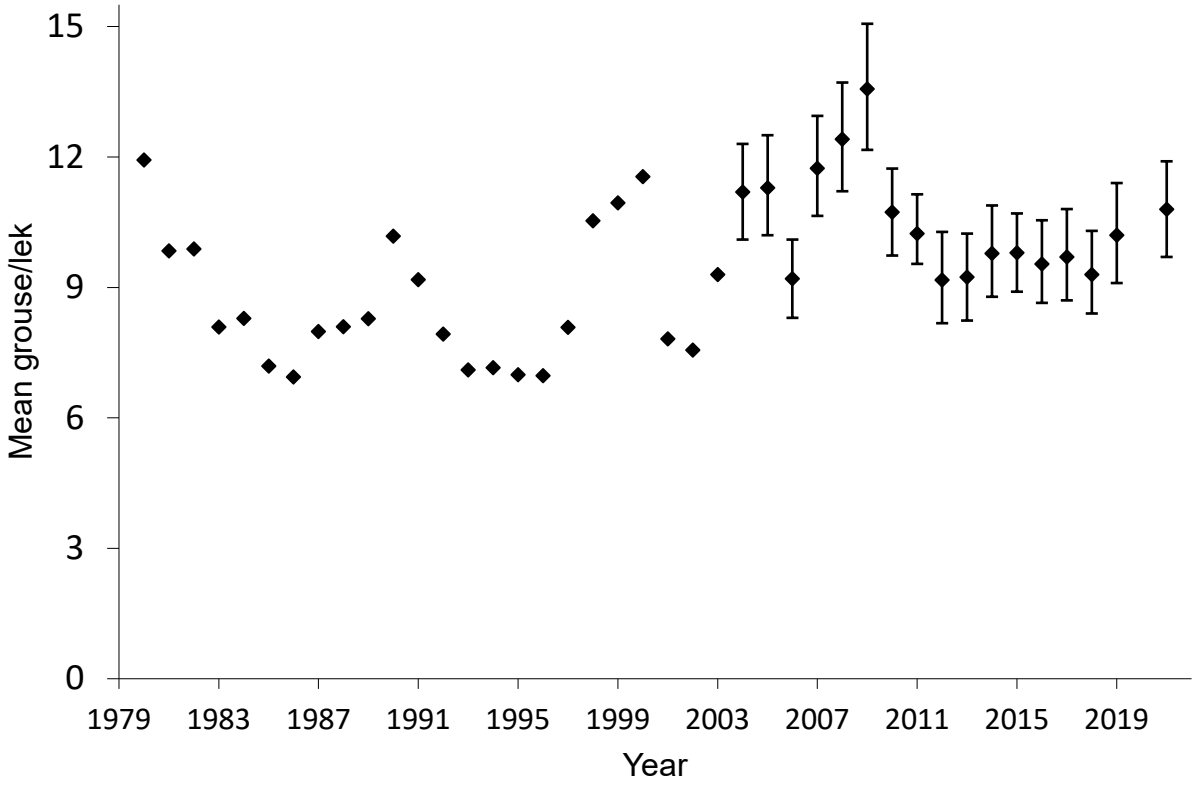

Figure 2. **Sharp-tailed grouse** counted in spring lek surveys statewide in Minnesota during 1980–2021. Bootstrap (95%) confidence intervals are provided for recent years. Annual means are not connected by lines because the same leks were not surveyed every year. No data were collected in 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic.

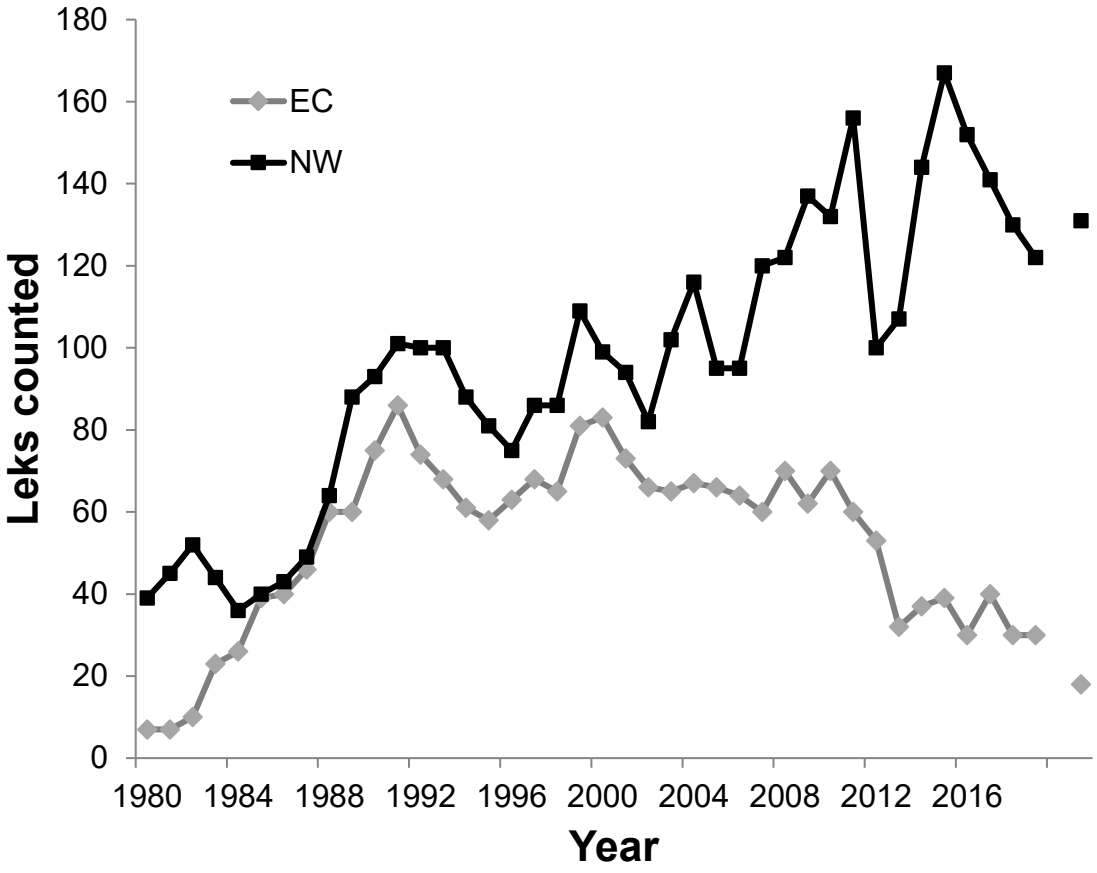

Figure 3. The number of **sharp-tailed grouse** leks with 2 or more birds counted in spring lek surveys in the Northwest (NW) and East Central (EC) survey regions of Minnesota during 1980 – 2021. Survey data were not collected in 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic.