



2020 MINNESOTA SPRING GROUSE SURVEYS

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18 June 2020

SUMMARY OF FINDINGS

The Minnesota DNR coordinates ruffed grouse (*Bonasa umbellus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) surveys each spring with the help of wildlife staff and cooperating federal, tribal, and county biologists. In 2020, Governor Walz issued Executive Orders 20-20 and 20-33, directing state employees to stay home except to perform essential work during 27 March – 4 May because of the COVID-19 pandemic. Federal and tribal biologists were exempted from these Executive Orders and were able to conduct fieldwork while social distancing to prevent the spread of COVID-19. Observers conducted ruffed grouse surveys in the northern portion of the state between 21 April – 13 May, but surveys in southern regions did not occur during the survey window. Mean ruffed grouse drums per stop (dps) were 1.6 statewide (95% confidence interval = 1.2–1.9) which is similar to last year, but the lack of surveys in the southern part of the state, a region where survey counts are usually lower, is likely causing the statewide index to be higher than it would be if southern regions were included. In the northern survey regions, counts were similar to or down from last year. High points in the population cycle occur on average every 10 years, and surveys indicate that the last peak was in 2017. Ruffed grouse in Minnesota are currently in the declining phase of the 10-year cycle.

DNR Wildlife Staff did not conduct sharp-tailed grouse surveys during 2020 due to the Governor's Stay at Home Orders during the COVID-19 pandemic. Thus, sharp-tailed grouse survey data are not available this year.

INTRODUCTION

The ruffed grouse (*Bonasa umbellus*) is the most popular game bird in Minnesota, with an annual harvest of 200,000–500,000 birds. Ruffed grouse hunter numbers have been as high as 92,000 during the last decade, although hunter numbers did not peak with recent peaks in grouse numbers, as they have traditionally. Sharp-tailed grouse (*Tympanuchus phasianellus*) are also popular among hunters, with an annual harvest of 5,000–22,000 birds since the early-1990s and 4,000–10,000 hunters in Minnesota.

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. Spring surveys provide evidence that the ruffed grouse population cycles at approximately 10-year intervals. The spring survey data also correlated strongly with the fall harvest before the early 2000s, but in recent decades, this relationship has weakened.

The first surveys of ruffed grouse in Minnesota occurred in the mid-1930s, and the first spring survey routes were established along roadsides in 1949. By the mid-1950s, ~50 routes were established with ~70 more routes added during the late-1970s and early-1980s. Since then, staff and cooperators have conducted spring drumming counts annually to survey ruffed grouse in the forested regions of the state where ruffed grouse habitat occurs. Drumming is a low sound produced by males as they beat their wings rapidly and in increasing frequency to signal the location of their territory. These drumming displays also attract females that are ready to begin nesting, so the frequency of drumming increases in the spring during the breeding season. The sound produced when male grouse drum is easy to hear and thus drumming counts are a convenient way to survey ruffed grouse populations in the spring.

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.

METHODS

Ruffed Grouse

Observers conducted ruffed grouse surveys along established routes throughout the state. Each route consisted of 10 listening stops at approximately 1.6-km (1-mile) intervals. The placement of routes on the landscape was determined from historical survey routes, which were originally placed near ruffed grouse habitat in low traffic areas. Annual sampling of these historical routes provides information about temporal changes along the routes, but may not be representative of the counties or regions where the routes occurred.

I engaged survey observers from among state, federal, tribal, private, and student biologists that had a professional background in wildlife science. Most observers had previously participated in the survey. I provided each observer a set of instructions and route location information, but did not provide formal survey training. I asked participants to conduct surveys at sunrise during peak drumming activity (in April or May) on days that had little wind and no precipitation. I provided guidance about the timing of the usual peak in drumming but allowed flexibility in timing to match the peak if it occurred outside the usual survey windows. Each observer drove the survey route once and listened for drumming at each stop for 4 minutes. Observers recorded the number of drums heard at each stop (not necessarily the number of individual grouse), along with information about phenology and weather at the time of the survey.

I used the number of drums heard per stop (dps) as the survey index value. I determined the mean dps for each route, for each survey region (Figure 1), and for the entire state. For each survey region, I calculated the mean of route-level means for all routes partially or entirely within each Ecological Classification System (ECS) section. Routes that traversed section boundaries

were included in the means for both sections. Because the number of routes within sections was not related to any proportional characteristic, I used the weighted mean of index values for the 4 ECS sections in the Northeast region and the 7 ECS sections in the state. I used the geographic area of the section as the weight for each section mean (i.e., Lake Agassiz, Aspen Parklands = 11,761 km², Northern Minnesota and Ontario Peatlands = 21,468 km², Northern Superior Uplands = 24,160 km², Northern Minnesota Drift and Lake Plains = 33,955 km², Western Superior Uplands = 14,158 km², Minnesota and Northeast Iowa Morainal (MIM) = 20,886 km², and Paleozoic Plateau (PP) = 5,212 km²). I reduced the area used to weight drum index means for the MIM and PP sections to reflect the portion of these areas within ruffed grouse range (~50%) using subsection boundaries. I calculated a 95% confidence interval (CI) to convey the uncertainty of each mean index value using 10,000 bootstrap samples of route-level means for survey regions and the whole state. I defined confidence interval boundaries as the 2.5th and 97.5th percentiles of bootstrap frequency distributions.

The COVID-19 pandemic affected the operation of ruffed grouse surveys in 2020. Governor Walz restricted non-essential fieldwork under Executive Orders 20-20 and 20-33 during 27 March – 4 May to prevent the spread of COVID-19. Usually ruffed grouse drumming surveys are completed during 8 – 30 April in the southern part of the state, 15 April – 5 May in the central region, and 20 April – 10 May in the northern part of the state, with some flexibility to match the peak of drumming when it occurs outside these survey windows. Thus, DNR Wildlife Staff missed the entire survey window in the southern region, began at the tail end of the window in the central region, and began in the last quarter of the survey window in the north. Nevertheless, some cooperators were exempt from the Executive Orders (e.g., federal biologists with the Forest Service and tribal biologists), and these cooperators conducted surveys when DNR Wildlife Staff could not. Many external cooperators also ran additional routes to maintain the integrity of the long-term data set, which is of value to their respective natural resource agencies, and because they could perform the survey while adhering to social distancing guidelines. The Governor issued Executive Order 20-48, allowing for “field research, monitoring, and surveying” to resume on 4 May, and the DNR Commissioner approved some DNR Wildlife Staff to conduct ruffed grouse surveys on 4 May. Observers conducted a few ruffed grouse surveys in the southern part of the state after the usual survey window and the peak in drumming, but I did not include these surveys in the analysis to ensure consistency in protocol and better comparability among years. General adherence to these protocols facilitates interpretation of population patterns in the context of the 10-year cycle.

Sharp-tailed Grouse

Wildlife staff and volunteers usually survey known sharp-tailed grouse lek locations in the Northwest (NW) and East Central (EC) portions of the state (Figure 2) during the peak in lek attendance, which usually occurs in the latter half of April and the first week of May. Although Governor Walz exempted “field research, monitoring and surveying” on 4 May, staff participation in sharp-tailed grouse surveys was not approved in time to complete the work. Therefore, DNR Wildlife Staff did not conduct any sharp-tailed grouse surveys during the peak in lek attendance in 2020. Unlike ruffed grouse surveys, few external cooperators participate in sharp-tailed grouse surveys.

RESULTS & DISCUSSION

Ruffed Grouse

Observers from 11 cooperating organizations surveyed 102 routes (80% of all routes) between 21 April and 13 May 2020, with 84% of northern routes completed and 42% of southern routes completed. Most routes (89%) were surveyed between 21 April and 10 May, with a median

survey date of May 6, which is similar to last year (May 4) and the median survey date for the most recent 10 years (May 3). Observers reported Excellent (61%), Good (37%), and Fair (2%) survey conditions for 95 routes reporting conditions.

Statewide counts of ruffed grouse drums averaged 1.6 dps (95% confidence interval = 1.2–1.9 dps) during 2020 (Figure 3). Drum counts were 1.7 (1.3–2.0) dps in the Northeast survey region ($n = 92$ routes), 1.2 (1.0–1.3) dps in the Northwest survey region ($n = 5$), 1.2 (0.4–2.2) dps in the Central Hardwoods survey region ($n = 10$), and no routes were completed during the appropriate survey window in the Southeast survey region (Figure 4a-d).

Statewide drum counts were similar to last year. I received 5 surveys from 2019 after the report was written last year, and updated results are included here. The southern survey regions tend to have lower average counts than the northern regions each year, and because southern regions were not surveyed in 2020, the statewide index is likely higher than it would be if southern routes were included. In the Northeast and Northwest, counts were similar to or down from last year, respectively. In the Central Hardwoods, observers surveyed only the northern portion of the region where counts tend to be higher, which likely explains the slightly higher, although not statistically different, dps in this region in 2020 compared to 2019. The most recent peak in the 10-year cycle occurred in 2017. Although peaks in the cycle occur on average approximately every 10 years, they vary from 8 to 11 years apart (Figure 3). Recent survey data indicate that ruffed grouse are in the declining phase of the 10-year cycle in Minnesota.

Sharp-tailed Grouse

Cooperators and staff did not collect sharp-tailed grouse survey data during the survey window in 2020. Survey data from recent years indicate a declining trend in both the NW and EC survey regions. The EC population has declined the most, with fewer than 300 birds (163 – 286) counted annually since 2013, and a drop in leks counted from 70 in 2010 to 30 in 2019. Continued monitoring of these populations will provide information that wildlife managers can use to make management decisions.

ACKNOWLEDGEMENTS

I would like to extend a special thanks to federal biologists from the Superior National Forest (USDA Forest Service), and tribal biologists with 1854 Treaty Authority and White Earth Reservation for surveying additional ruffed grouse routes this spring while exempted from the Governor's Stay at Home Order. The extra efforts of H. Becker, T. Brannock, D. Garrison, D. Grosshuesch, S. Malick-Wahls, D. McArthur, D. Ryan, S. Swanson, M. Swingen, and others ensured that surveys were conducted during the appropriate temporal window, and that survey data collected annually since 1949 and used by numerous natural resource agencies and cooperators to make decisions, could continue during the pandemic. The ruffed grouse survey was also accomplished this year through the combined efforts of staff and volunteers at Chippewa National Forests; Fond du Lac and Red Lake Reservations; Blandin Paper; Beltrami County and Cass County Land Departments; and DNR staff at Baudette, Bemidji, Cloquet, Crookston, Detroit Lakes, Fergus Falls, Grand Rapids, International Falls, Park Rapids, Red Lake WMA, Roseau River WMA, Sauk Rapids, Thief Lake WMA, Thief River Falls, Tower, and Two Harbors work areas. Several other staff and volunteers usually participate in the ruffed grouse drumming survey but were not able to during the appropriate survey window due to the pandemic. These work areas included Aitkin, Brainerd, Carlos Avery Wildlife Management Area, Karlstad, Little Falls, Mille Lacs WMA, Rochester, Whitewater WMA, and Winona work areas, as well as Vermilion Community College, Leech Lake Reservation, and Agassiz National Wildlife Refuge. Gary Drotts, John Erb, and Rick Horton organized an effort to enter the ruffed grouse survey data for 1982–2004, and Doug Mailhot and another volunteer helped enter the data. In

2020, Jackson Bates and Nicole Dotson entered ruffed grouse survey data for 1979-1981. I would also like to thank Lindsey Shartell and Leslie McInenly for making helpful comments on this report. This work was funded in part through the Federal Aid in Wildlife Restoration Act.

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

Year	Statewide			Northwest ^a			East Central ^a		
	Mean	95% CI ^b	<i>n</i> ^c	Mean	95% CI ^b	<i>n</i> ^c	Mean	95% CI ^b	<i>n</i> ^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

^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.

Comparison ^b	Statewide			Northwest ^a			East Central ^a		
	Mean	95% CI ^c	<i>n</i> ^d	Mean	95% CI ^c	<i>n</i> ^d	Mean	95% CI ^c	<i>n</i> ^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

^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.

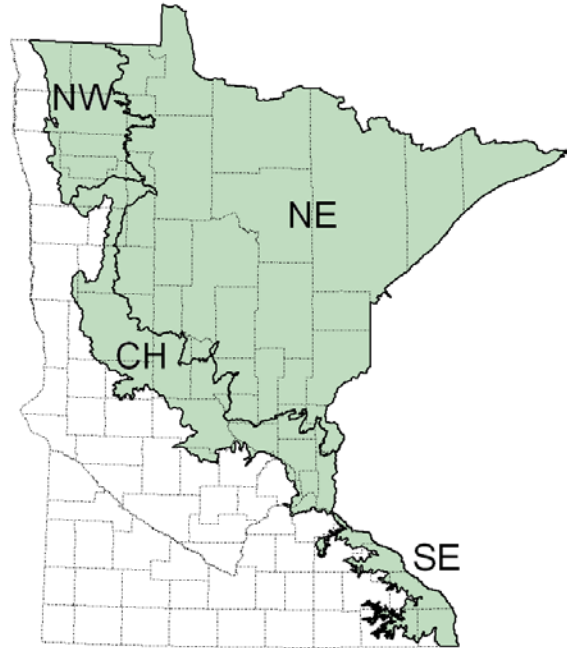


Figure 1. Survey regions for **ruffed grouse** in Minnesota. Northwest (NW), Northeast (NE), Central Hardwoods (CH), and Southeast (SE) survey regions are depicted relative to county boundaries (dashed lines) and influenced by the Ecological Classification System.

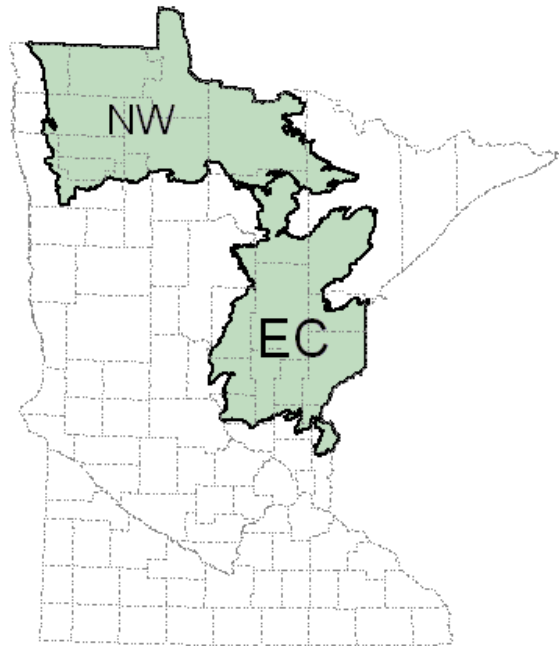


Figure 2. Survey regions for **sharp-tailed grouse** in Minnesota. Northwest (NW) and East Central (EC) survey regions are depicted relative to county boundaries (dashed lines) and influenced by Ecological Classification System Subsection boundaries.

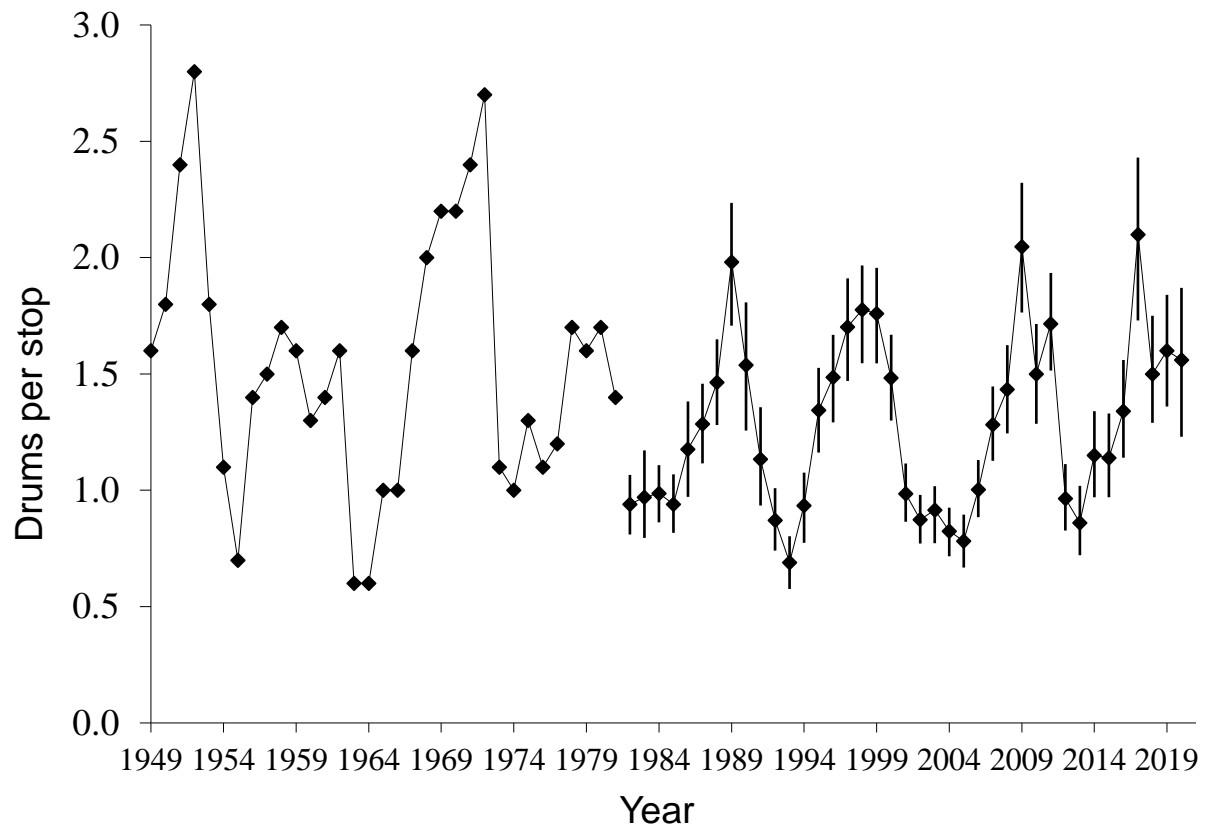
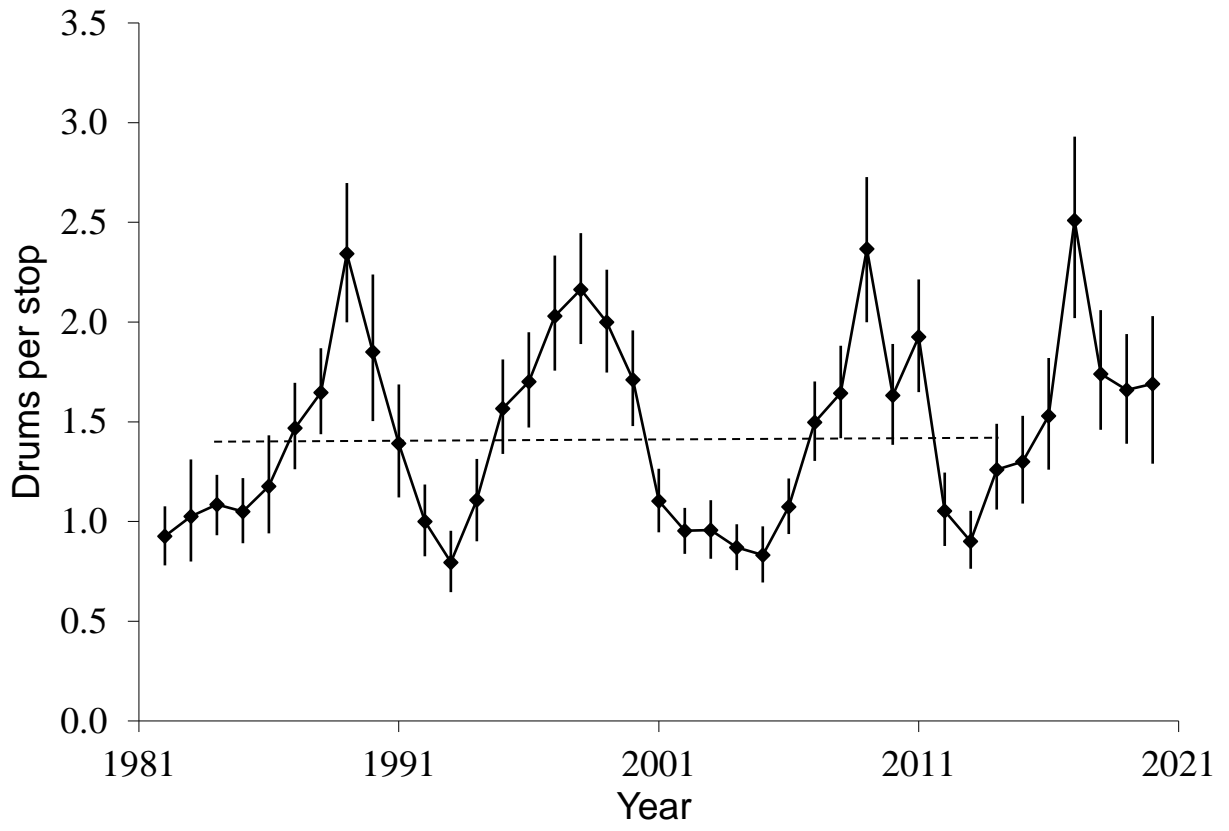
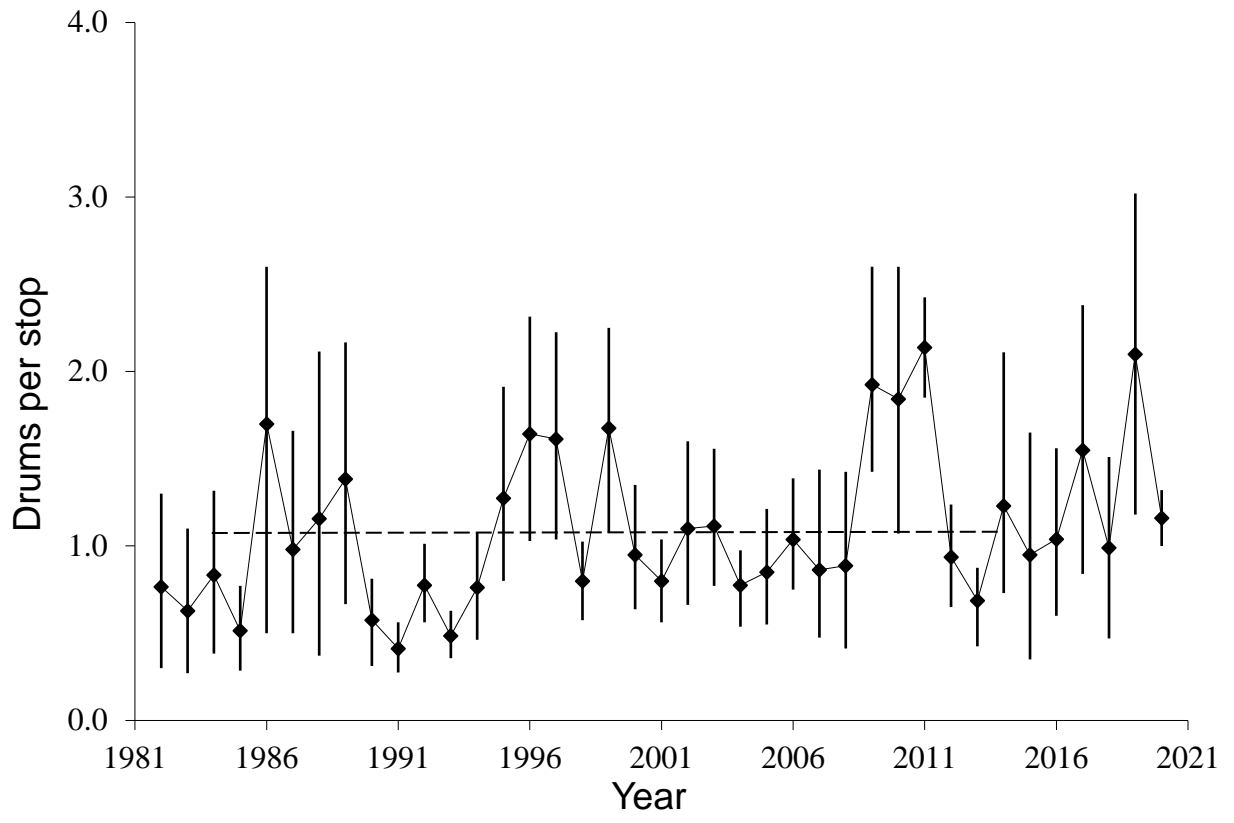


Figure 3. Statewide **ruffed grouse** population index values in Minnesota. Bootstrap (95%) confidence intervals (CI) are provided after 1981, but different analytical methods were used prior to this and thus CI are not available for earlier years. The difference between 1981 and 1982 is biological and not an artifact of the change in analysis methods.

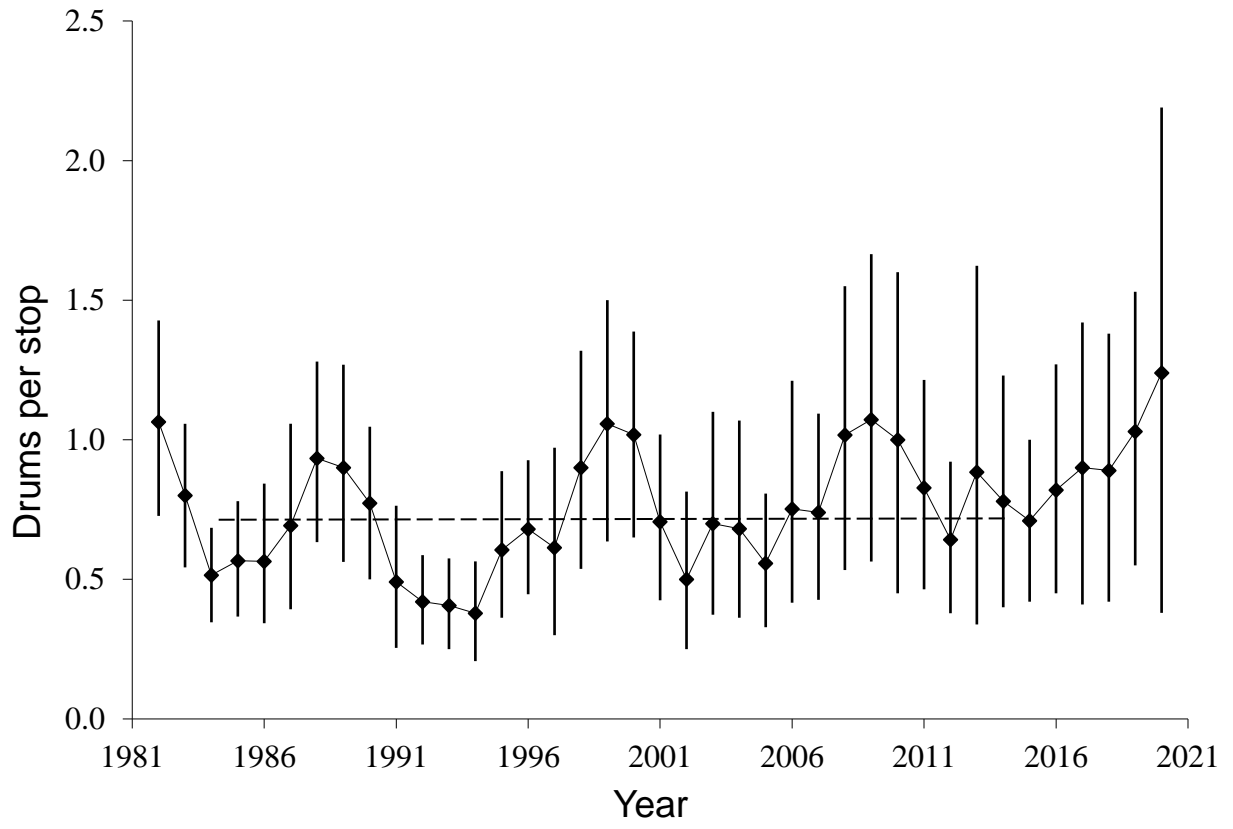
a.



b.



c.



d.

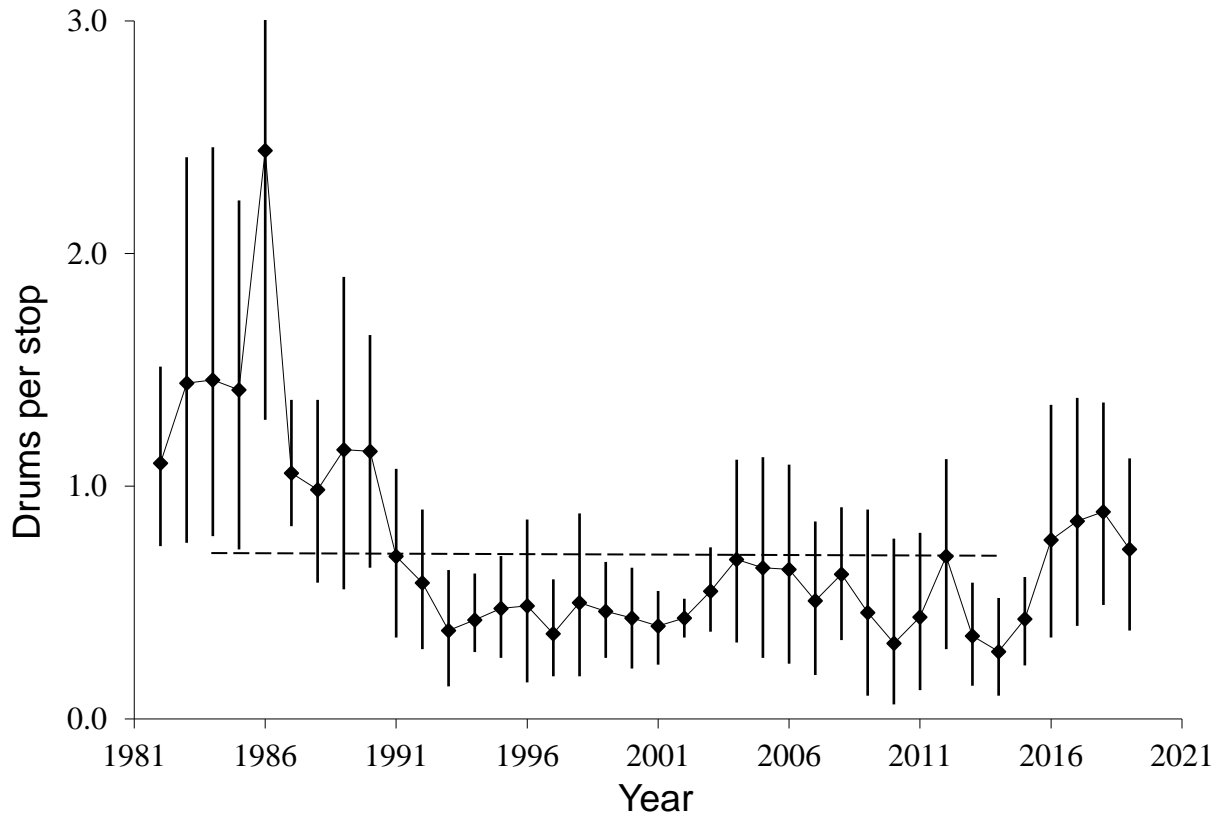


Figure 4a,b,c,d. **Ruffed grouse** population index values in the **Northeast** (a), **Northwest** (b), **Central Hardwoods** (c), and **Southeast** (d) survey regions of Minnesota. The mean for 1984-2014 is indicated by the dashed line. Bootstrap (95%) confidence intervals are provided for each mean. In the bottom panel, the CI for 1986 extends beyond area depicted in the figure. Data were not collected during the survey window in the Southeast during the COVID-19 pandemic in 2020, so the last point is from 2019.

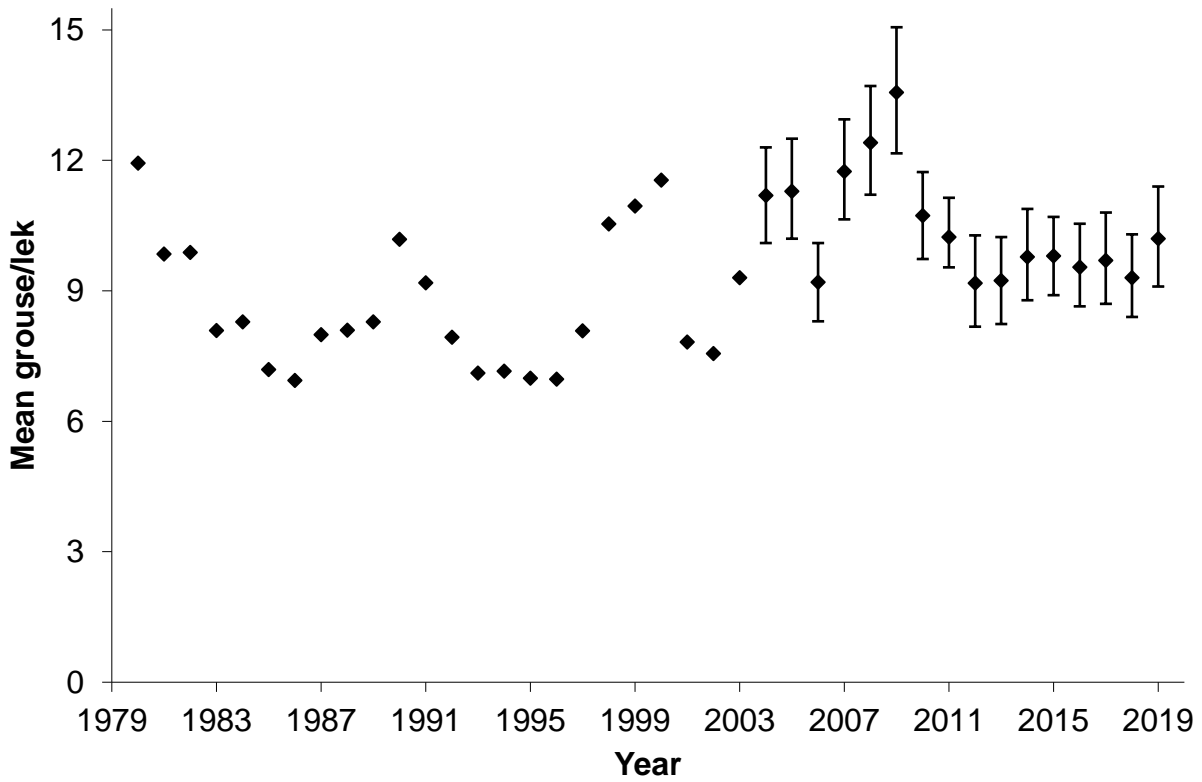


Figure 5. **Sharp-tailed grouse** counted in spring lek surveys statewide in Minnesota during 1980–2019. Bootstrap (95%) confidence intervals are provided for recent years. Annual means are not connected by lines because the same leks were not surveyed every year. No data were collected in 2020 due to the Governor’s Stay at Home Order during the COVID-19 pandemic, so data are presented through 2019.

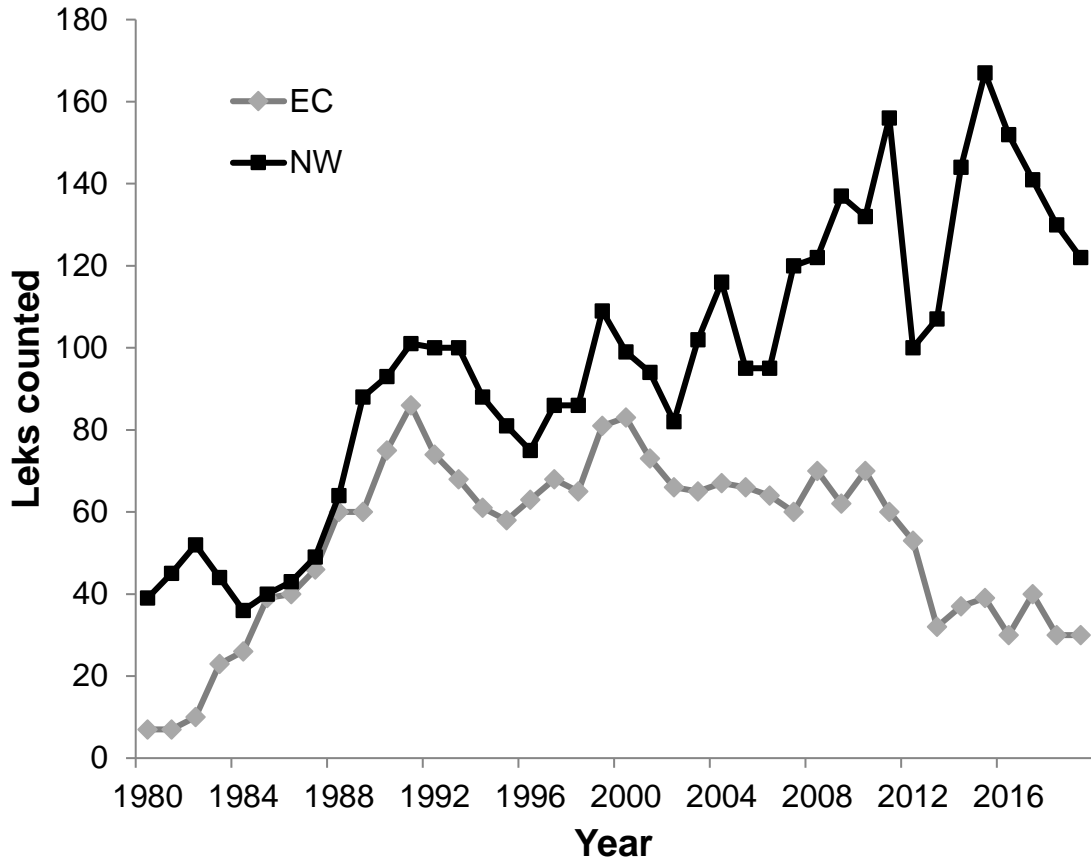


Figure 6. The number of **sharp-tailed grouse** leks with 2 or more birds counted in spring lek surveys in the Northwest (NW) and East Central (EC) survey regions of Minnesota during 1980-2019. Survey data were not collected in 2020 due to the Governor's Stay at Home Order during the COVID-19 pandemic, so data are presented through 2019.