# 2021 MINNESOTA RUFFED GROUSE SURVEY

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## SUMMARY OF FINDINGS

The Minnesota DNR coordinates ruffed grouse (*Bonasa umbellus*) surveys each spring with the help of wildlife staff and cooperating federal, tribal, and county biologists. Mean ruffed grouse drums per stop (dps) were 1.3 statewide (95% confidence interval = 1.1 – 1.4), which is down from 1.6 dps last year. Lower dps are expected during the declining phase of the ruffed grouse population cycle. High points in the population cycle occur on average every 10 years, and surveys indicate that the last peak in the cycle occurred in 2017. However, lower dps compared to last year might also be due in part to a slight bias in 2020 due to restrictions on field surveys during the Governor's Stay at Home Order. Surveys could not be conducted during the appropriate survey window in the southern survey region, where counts are usually lower, possibly biasing data high last 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.

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.

## METHODS

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 Section (ECS). Routes that traversed regional boundaries were included in the means for both regions. Because the number of routes within regions 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 $km^2$, Northern Minnesota and Ontario Peatlands = 21,468 $km^2$, Northern Superior Uplands = 24,160 $km^2$, Northern Minnesota Drift and Lake Plains = 33,955 $km^2$, Western Superior Uplands = 14,158 $km^2$, Minnesota and Northeast Iowa Morainal (MIM) = 20,886 $km^2$, and Paleozoic Plateau (PP) = 5,212 $km^2$). 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 $2.5^{th}$ and $97.5^{th}$ percentiles of bootstrap frequency distributions.

## RESULTS & DISCUSSION

Observers from 12 cooperating organizations surveyed routes between 6 April and 14 May 2021. Most routes (88%) were surveyed between 20 April and 10 May, with a median survey date of 28 April, which is earlier than most years when the median survey date is closer to May 3. However, many observers reported an earlier spring than usual and completed surveys when they believed the peak of drumming was occurring in their local area. Observers reported

Excellent (61%), Good (36%), and Fair (3%) survey conditions for 122 routes that reported survey conditions.

Statewide counts of ruffed grouse drums averaged 1.3 dps (95% confidence interval = 1.1 – 1.4 dps) during 2021 (Figure 2). Drum counts were 1.4 (1.2 – 1.7) dps in the Northeast ($n$ = 105 routes), 1.1 (0.8 – 1.4) dps in the Northwest ($n$ = 8), 0.8 (0.4 – 1.2) dps in the Central Hardwoods ($n$ = 15), and 0.9 (0.4 – 1.6) dps in the Southeast region ($n$ = 8) (Figure 3a-d).

Statewide drum counts were down from last year as expected during the declining phase of the 10-year cycle. 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 2). However, ruffed grouse counts might have been biased high in 2020 because of constraints on the ruffed grouse survey during the COVID-19 pandemic. Surveys from the southern region, which tend to have lower dps, were not conducted during the survey window in 2020 and were excluded from the analysis. Thus, declines this year might appear to be larger than they would if data collection were more comparable between this year and last year.

## 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 last 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 Forest; Fond du Lac, Leech Lake, Red Lake, and White Earth Reservations; Blandin Paper; Beltrami County Land Department; and DNR staff at Aitkin, Baudette, Bemidji, Brainerd, Carlos Avery Wildlife Management Area (WMA), Cloquet, Crookston, Detroit Lakes, Fergus Falls, Grand Rapids, Karlstad, Little Falls, Mille Lacs WMA, Park Rapids, Red Lake WMA, Rochester, Roseau River WMA, Sauk Rapids, Thief Lake WMA, Thief River Falls, Tower, Two Harbors, Whitewater WMA, and Winona work areas. Vermilion Community College, Tamarac National Wildlife Refuge and Agassiz National Wildlife Refuge also participated in surveys. Prior to 2013, 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. In 2021, Lydia Spann helped enter ruffed grouse survey data for 1972 – 1978. A. Vinar ran routes near International Falls. I would also like to thank Lindsey Shartell for making helpful comments on this report. This work was funded in part through the Federal Aid in Wildlife Restoration Act.

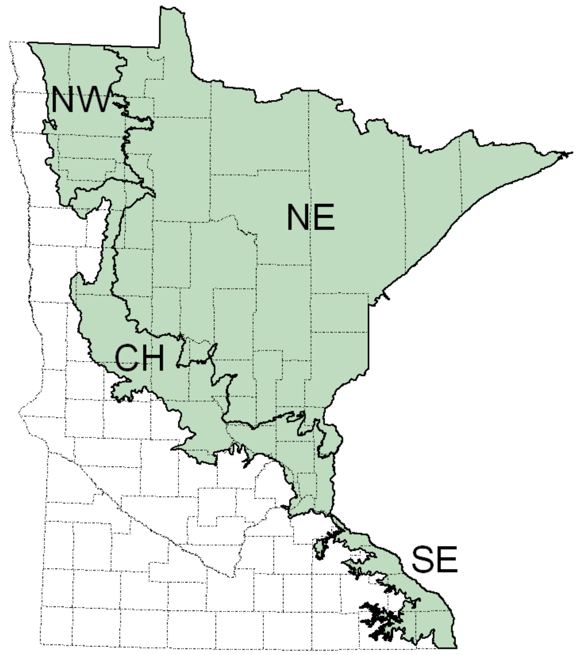



Figure 1.  Survey regions for **ruffed grouse** in Minnesota. Northwest (NW), Northeast (NE), Central Hardwoods (CH), and Southeast (SE) survey regions are depicted relative to county boundaries (dashed lines) and influenced by the Ecological Classification System.

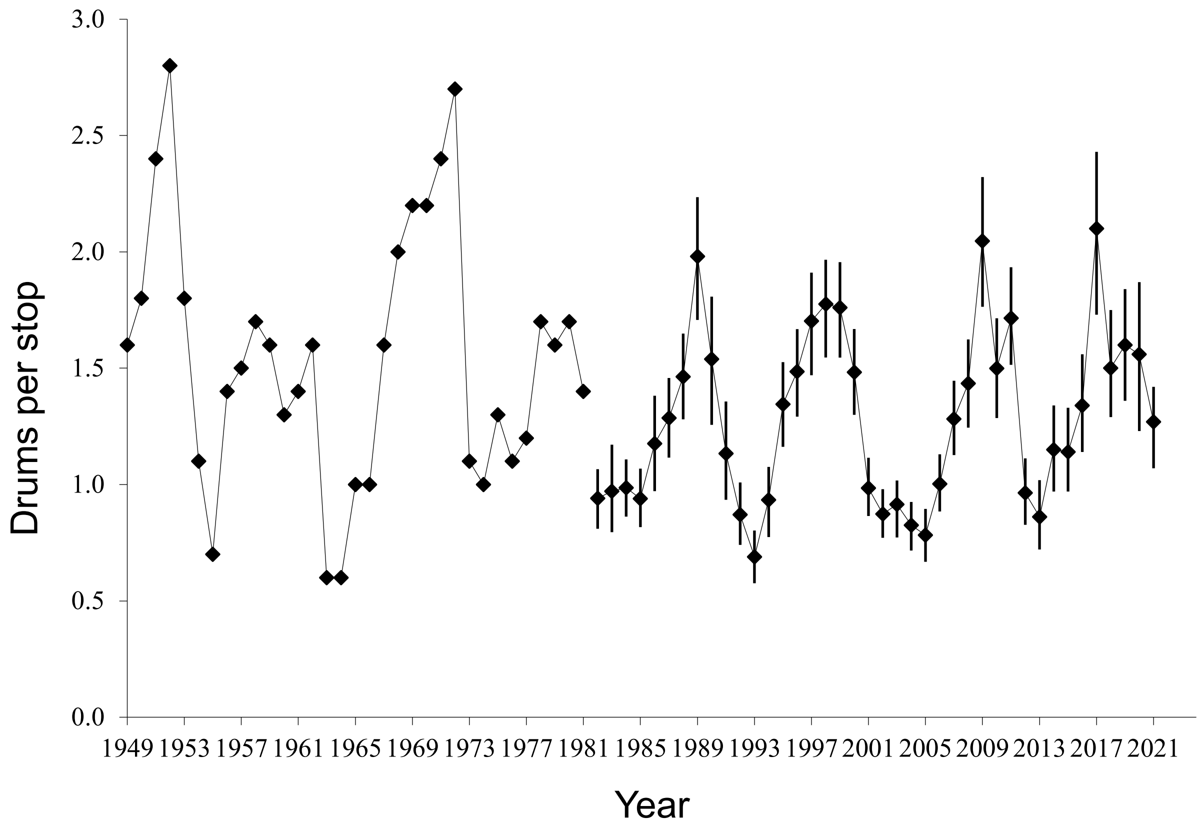
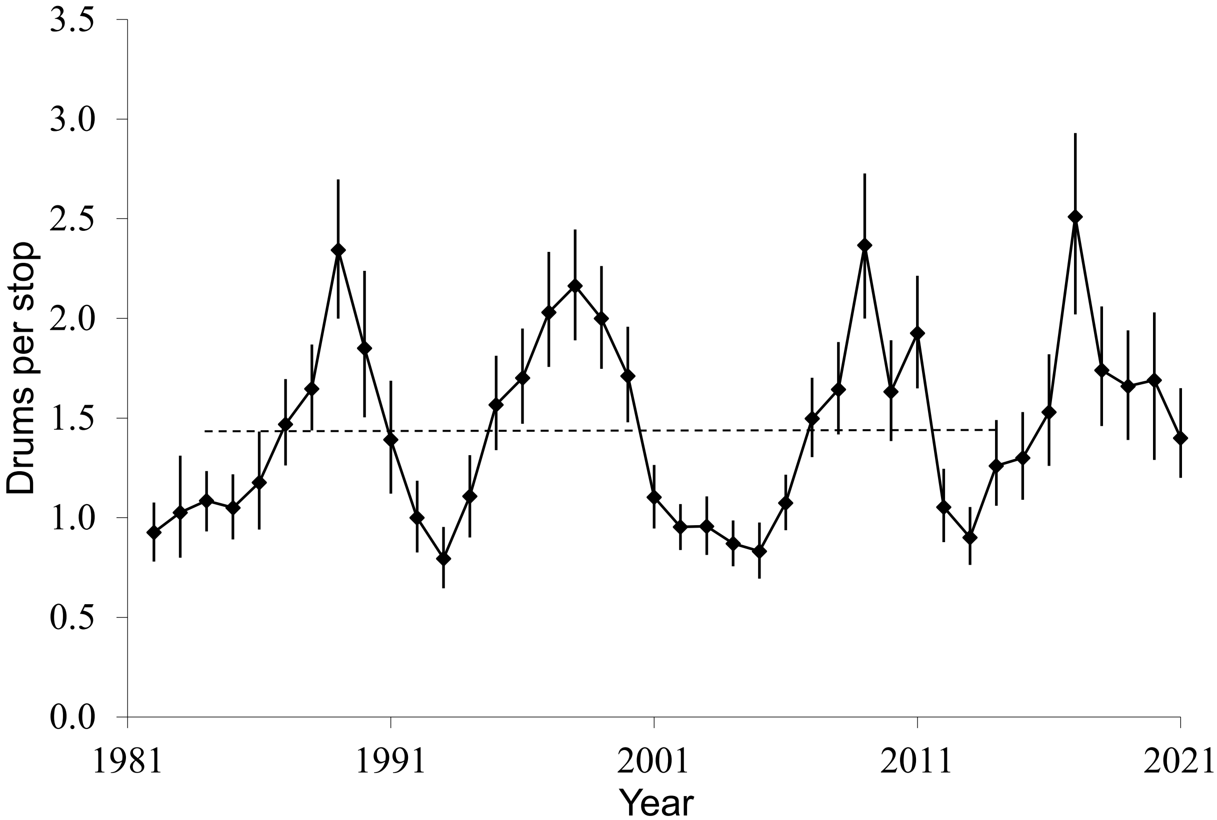



Figure 2. Statewide ruffed grouse population index values in Minnesota. Bootstrap (95%) confidence intervals (CI) are provided after 1981, but different analytical methods were used prior to this and thus CI are not available for earlier years. The difference between 1981 and 1982 is biological and not an artifact of the change in analysis methods.

a.


3.5
3.0
2.5
2.0
1.5
1.0
0.5
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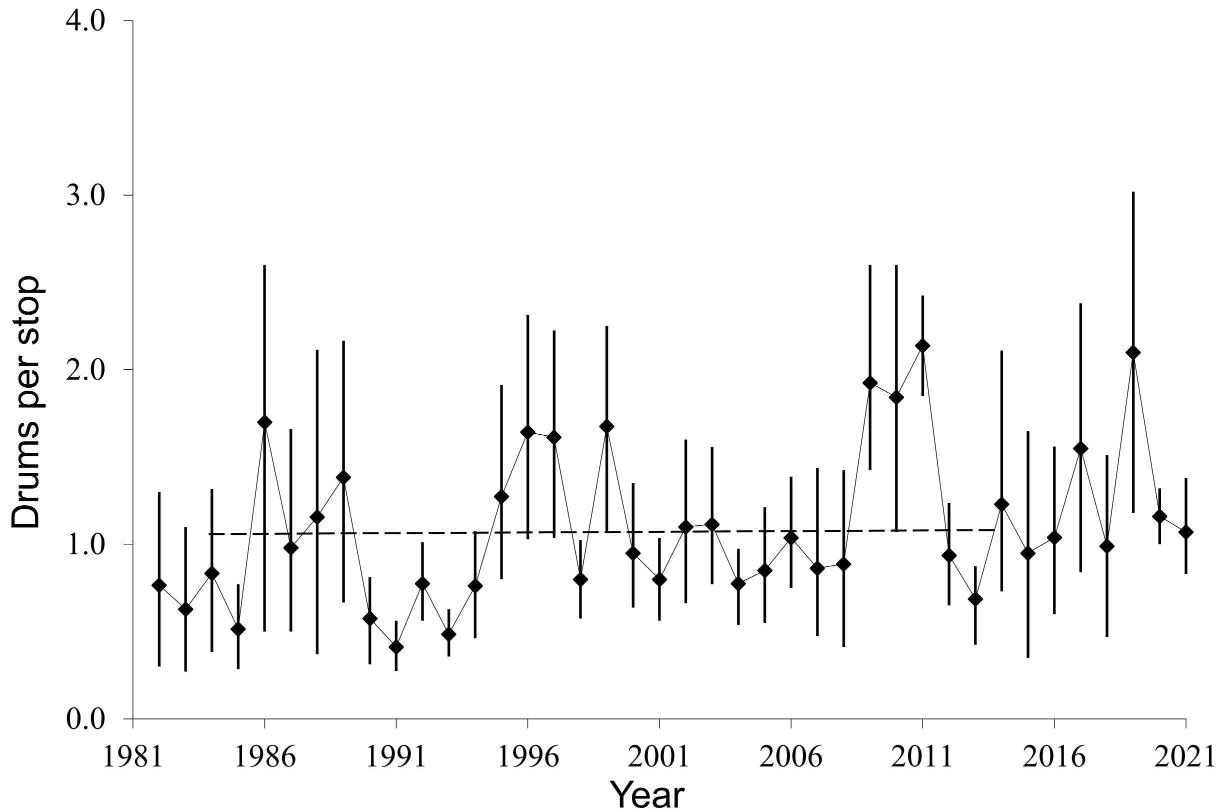
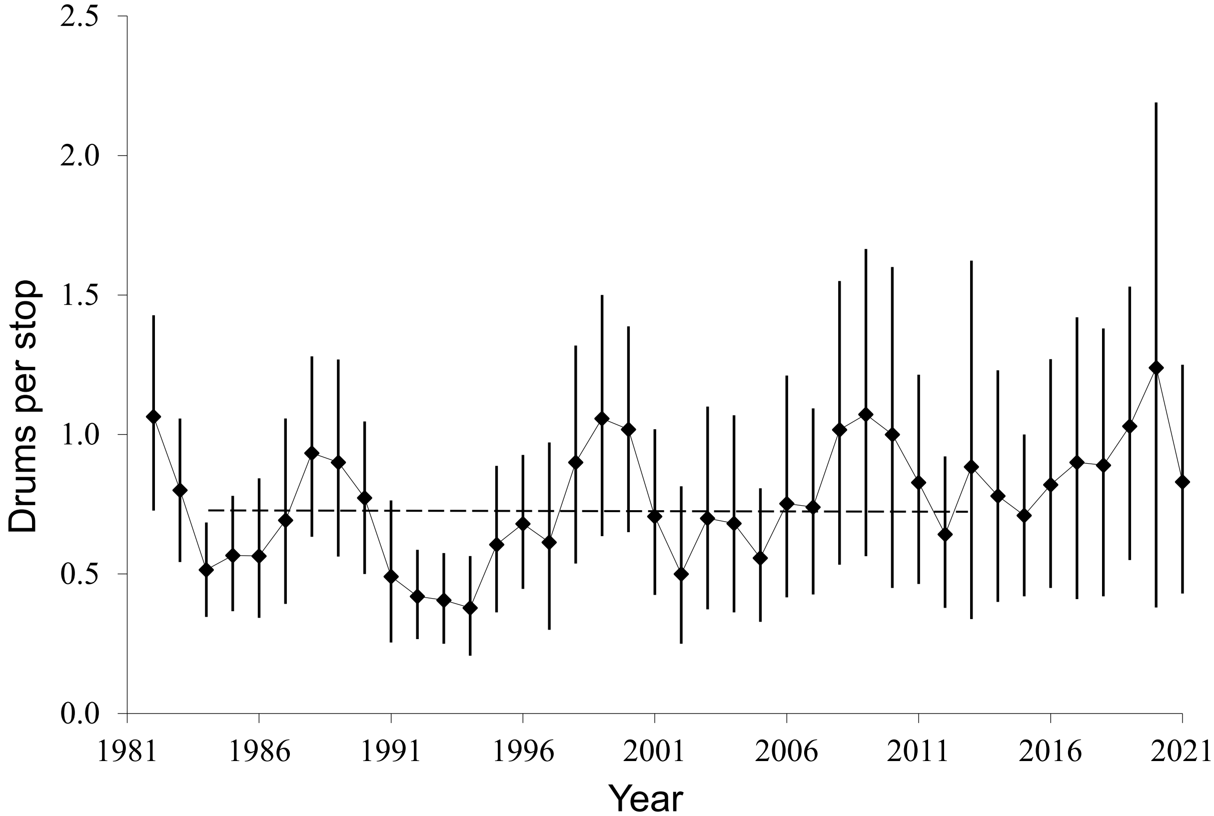
Drums per stop
1981
1991
2001
2011
2021
Year

b.


4.0
3.0
2.0
1.0
0.0
Drums per stop
1981
1986
1991
1996
2001
2006
2011
2016
2021
Year

c.



2.5
2.0
1.5
1.0
0.5
0.0
Drums per stop
1981
1986
1991
1996
2001
2006
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Year

d.

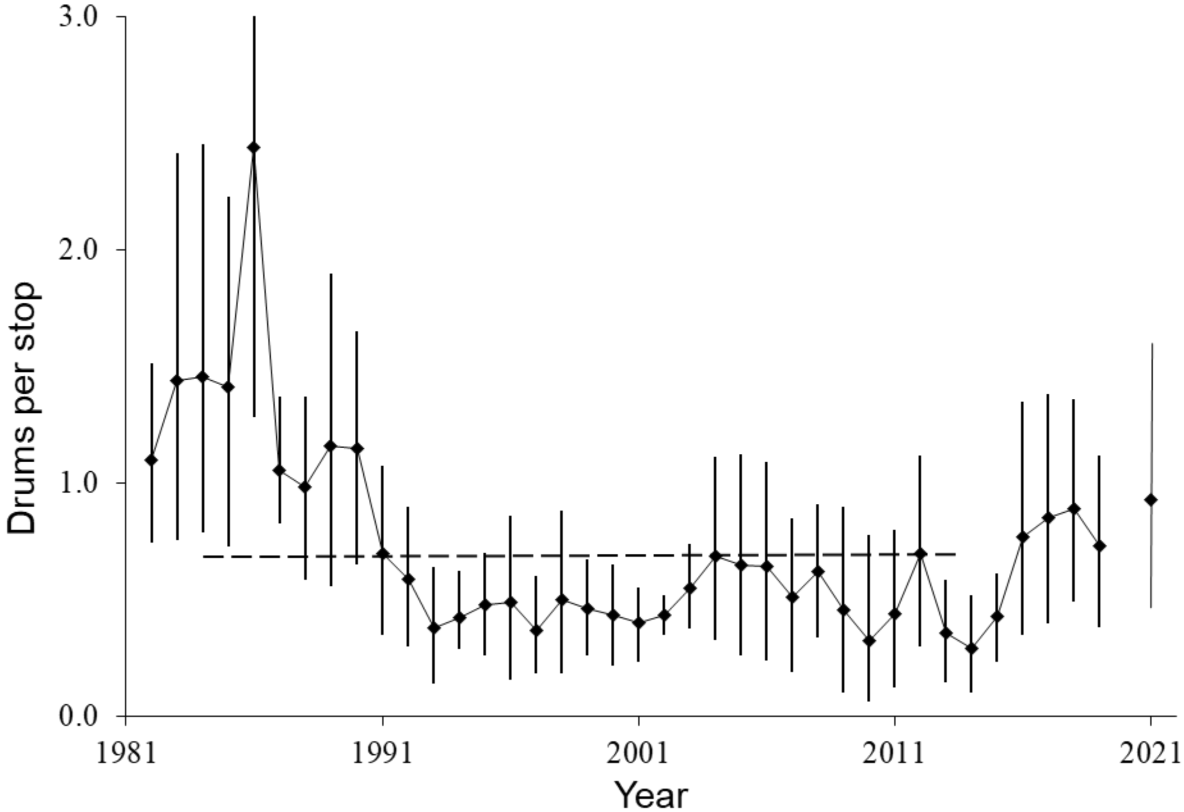


Figure 3a,b,c,d. Ruffed grouse population index values in the **Northeast** (a), **Northwest** (b), **Central Hardwoods** (c), and **Southeast** (d) survey regions of Minnesota. The mean for 1984-2014 is indicated by the dashed line. Bootstrap (95%) confidence intervals are provided for each mean. In 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.