2022 MINNESOTA RUFFED GROUSE SURVEY

Charlotte Roy
Forest Wildlife Populations and Research Group
Minnesota Department of Natural Resources
Grand Rapids, Minnesota
29 June 2022

SUMMARY OF FINDINGS

The Minnesota DNR coordinates ruffed grouse (*Bonasa umbellus*) drumming surveys each spring with the help of wildlife staff and cooperating federal, tribal, and county biologists. Mean ruffed grouse drums per stop (dps) were 1.9 statewide (95% confidence interval = 1.7 – 2.2), which is unexpectedly up from 1.3 dps last year. Lower dps were expected because we are in the declining phase of the 10-year population cycle. However, spring and summer of 2021 were very hot and dry (i.e., extreme drought throughout much of northern Minnesota), which may have resulted in exceptional production of young because cold, wet weather adversely affects nests and chicks. This drought was followed by favorable snow roosting conditions throughout much of the core of ruffed grouse range during winter 2021–2022. Snow roosting provides thermoregulatory benefits, cover from predators, and may increase overwinter survival. These favorable environmental factors might explain the unexpectedly high spring drumming counts this spring. However, widespread flooding and numerous heavy rainfall events during May and June 2022 in the core of grouse range may reduce production of young birds this year, and potentially confound expectations for the fall hunting season.

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 14 cooperating organizations surveyed routes between 7 April and 24 May 2022. Many observers reported a later spring than usual and completed surveys when they believed the peak of drumming was occurring in their local area. Most routes (89%) were surveyed between 19 April and 18 May, with a median survey date of 5 May, which is similar to most years when the median survey date is close to May 3. Observers reported Excellent (64%), Good (31%), and Fair (5%) survey conditions for 114 routes reporting conditions.

Statewide counts of ruffed grouse drums averaged 1.9 dps (95% confidence interval = 1.7 – 2.2 dps) during 2022 (Figure 2). Drum counts were 2.0 (1.7 – 2.2) dps in the Northeast (n = 94 routes), 2.9 (2.0 – 3.8) dps in the Northwest (n = 8), 1.4 (0.6 – 2.3) dps in the Central Hardwoods (n = 11), and 1.0 (0.4 – 1.7) dps in the Southeast region (n = 8) (Figure 3a-d).

Statewide drum counts were up from last year, which was unexpected during the declining phase of the 10-year cycle, after the most recent peak in 2017. Peaks in the cycle occur on average every 10 years, but vary from 8 to 11 years apart (Figure 2). Many survey cooperators reported higher than expected counts this spring. Warm temperatures and drought conditions last spring and summer may have resulted in strong production of young birds last year (Bump et al. 1947, Dorney and Kabat 1960). Drought followed by winter conditions favorable for snow roosting in much of the core of ruffed grouse range may have increased overwinter survival (Thompson and Fritzell 1988), perhaps explaining the high counts this spring. However, May and June 2022 have been much wetter, with widespread flooding and numerous heavy rainfall events throughout much of northern Minnesota, which may adversely affect nest and chick survival in the core of the ruffed grouse range. If this is true, the high spring counts of 2022 may not translate into high fall grouse numbers. In recent years, the drumming survey has not been a reliable predictor of fall hunting experiences.

ACKNOWLEDGEMENTS

The ruffed grouse survey was accomplished this year through the combined efforts of staff and volunteers at 1854 Treaty Authority; Agassiz National Wildlife Refuge (NWR); Blandin Paper; Beltrami and Cass County Land Departments; Chippewa National Forest (NF); Fond du Lac, Leech Lake, and Red Lake Reservations; Superior NF; Tamarac NWR; Vermilion Community College; White Earth Reservation; and DNR staff at Aitkin, Baudette, Bemidji, Brainerd, 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. G. Drotts, J. Erb, and R. Horton organized entry of 1982–2004 survey data, with D. Mailhot and another volunteer prior to 2013. J. Bates and N. Dotson entered 1979–1981 data in 2020; L. Spann entered 1972–1978 data in 2021; J. Hanrahan entered 1968–1971 data in 2022. M. Larson reviewed this report. This work was funded in part by the Federal Aid in Wildlife Restoration Act.

Literature cited

Bump, G., R. W. Darrow, F. C. Edminster, W. F. Crissey. 1947. The ruffed grouse—life history, propagation, management. New York State Cons. Dept. Albany 915 pp.

Dorney, R. S., C. Kabat. 1960. Relation of weather, parasitic disease and hunting to Wisconsin ruffed grouse populations. Wisconsin Cons. Dept. Technical Bulletin 20.

Thompson, F. R., and E. K. Fritzell. 1988. Ruffed grouse winter roost site preference and influence on energy demands. Journal of Wildlife Management 52:454-460.

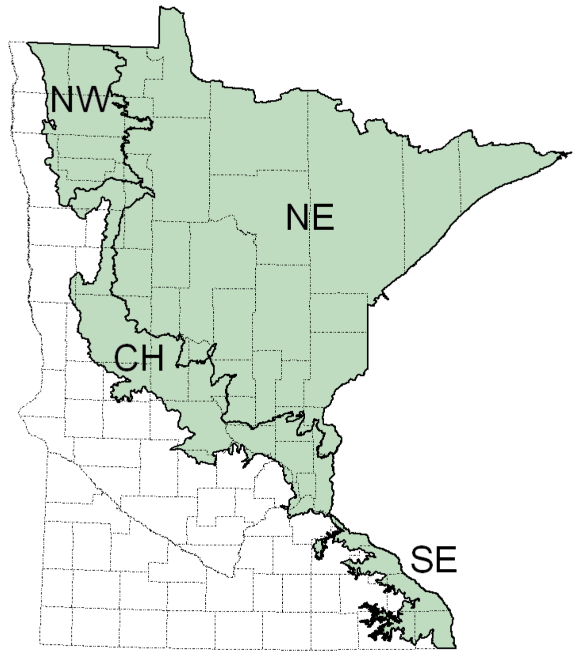


Figure 1. Survey regions for **ruffed grouse** in Minnesota. Northwest (NW), Northeast (NE), Central Hardwoods (CH), and Southeast (SE) survey regions are depicted relative to county boundaries (dashed lines) and influenced by the Ecological Classification System.

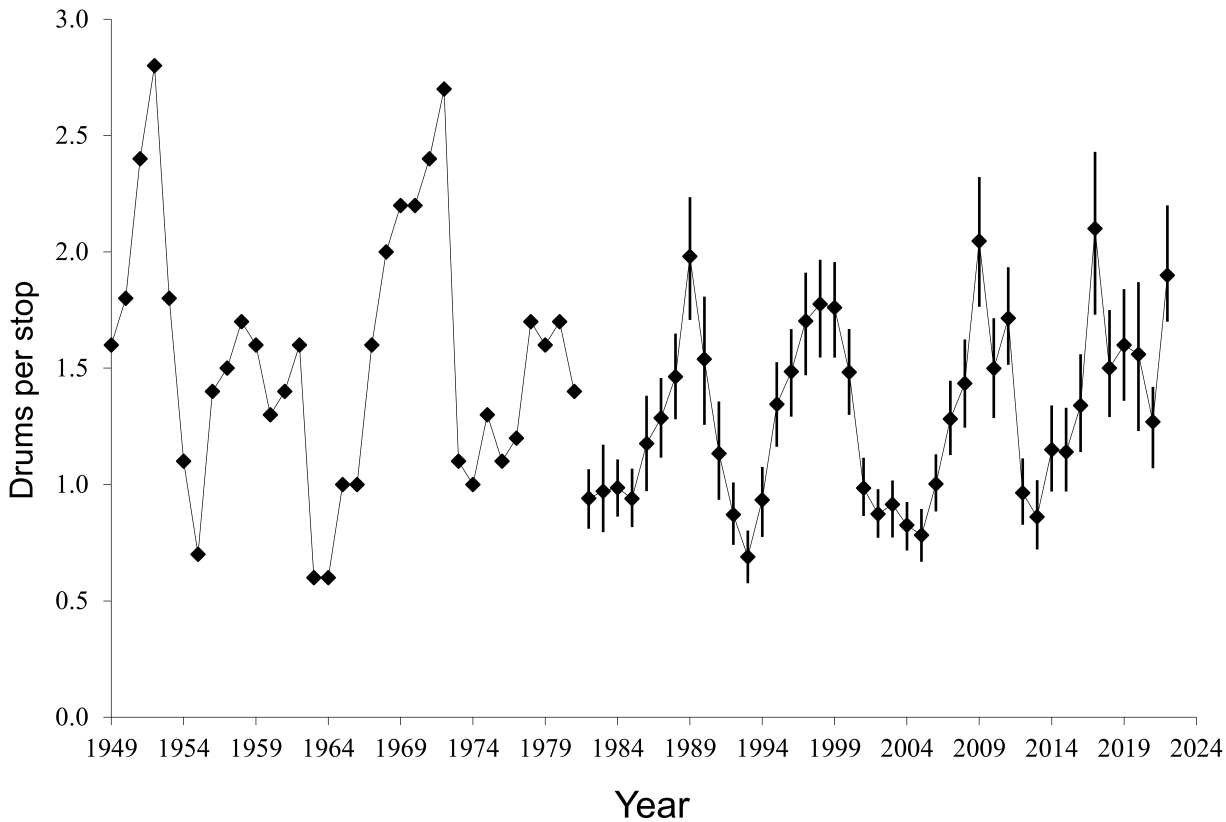
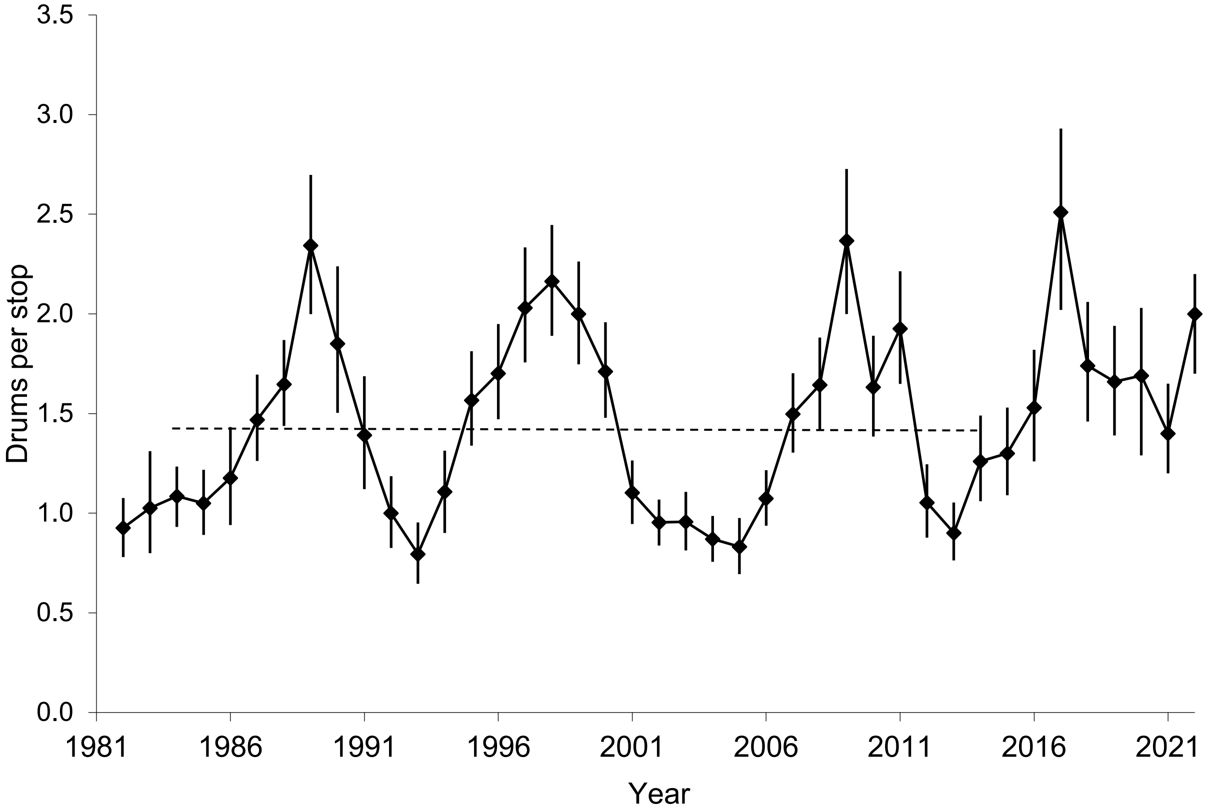


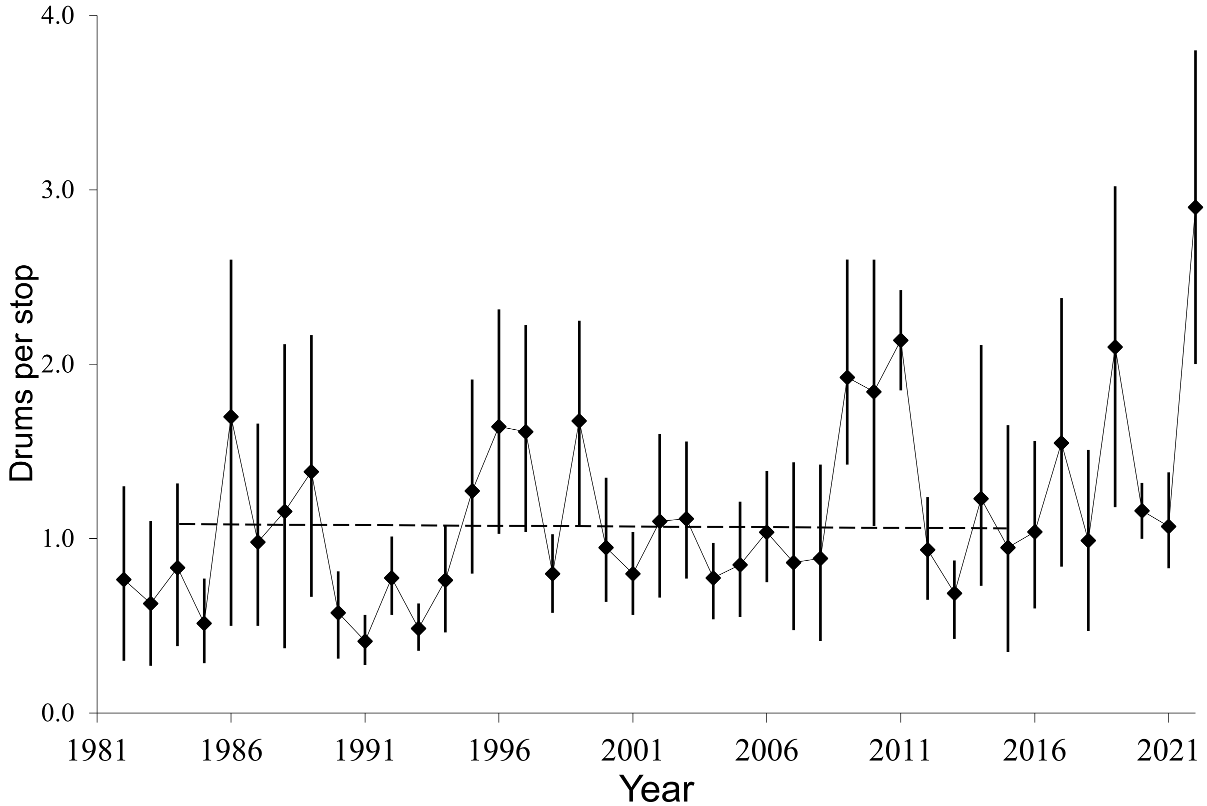
Figure 2. Statewide ruffed grouse population index values in Minnesota. Bootstrap (95%) confidence intervals (CI) are provided after 1981, but different analytical methods were used prior to this and thus CI are not available for earlier years. The difference between 1981 and 1982 is biological and not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

a.

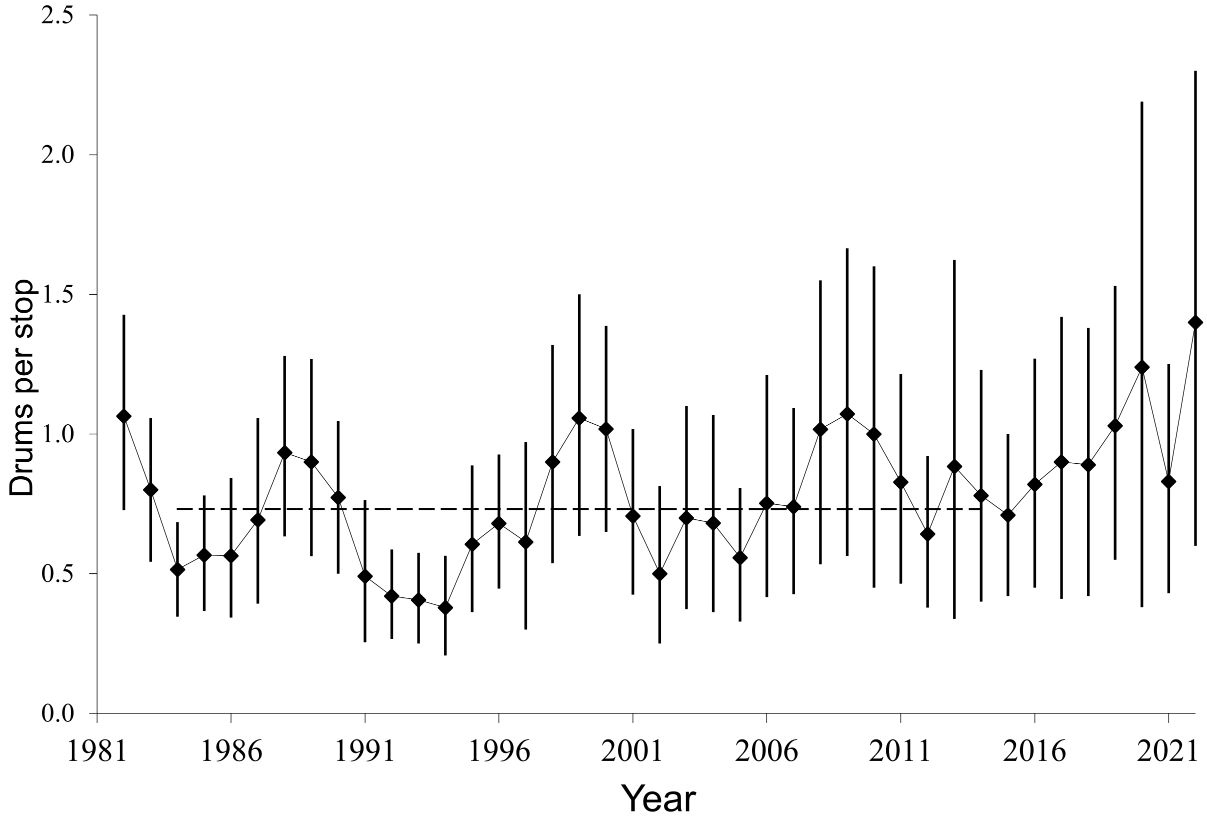


3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Drums per stop
1981
1986
1991
1996
2001
2006
2011
2016
2021
Year

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.



Drums per stop
2.5
2.0
1.5
1.0
0.5
0.0
1981
1986
1991
1996
2001
2006
2011
2016
2021
Year

d.

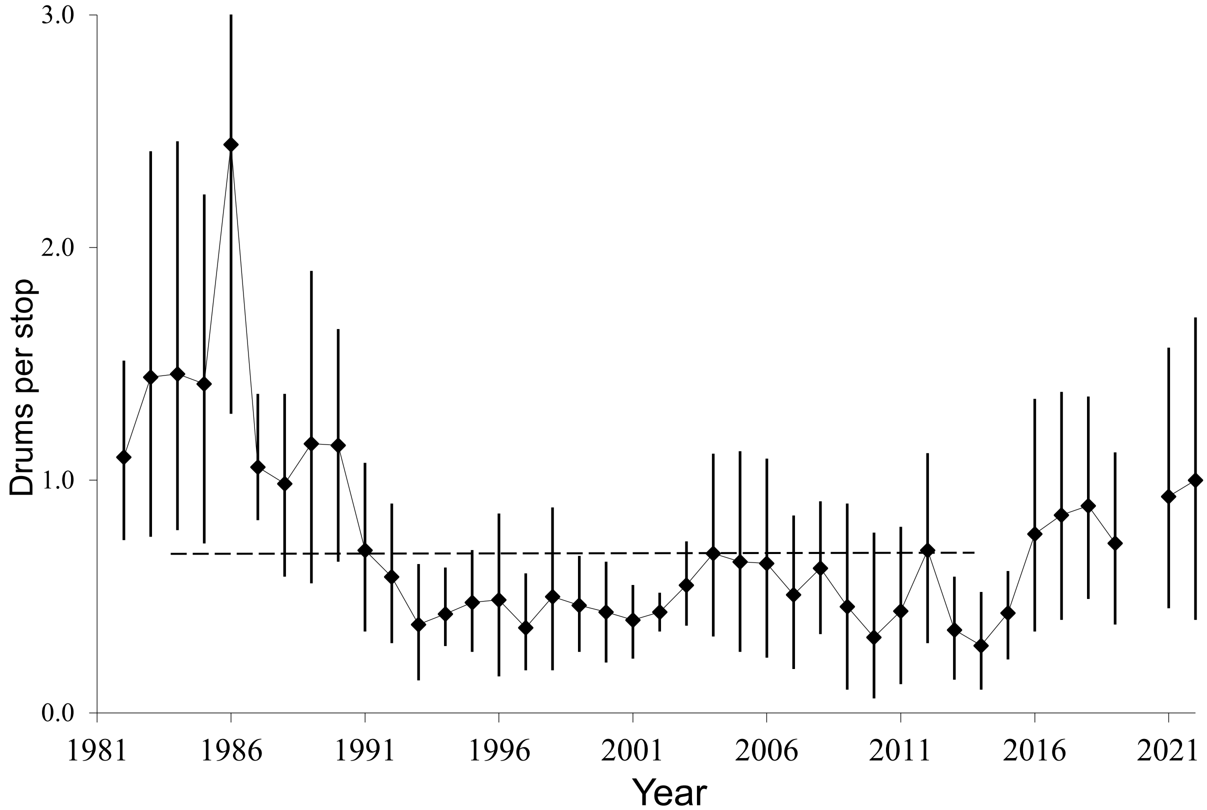


Figure 3a,b,c,d. Ruffed grouse population index values in the **Northeast** (a), **Northwest** (b), **Central Hardwoods** (c), and **Southeast** (d) survey regions of Minnesota. The mean for 1984-2014 is indicated by the dashed line. Bootstrap (95%) confidence intervals are provided for each mean. In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