



2020 MINNESOTA PRAIRIE-CHICKEN POPULATION SURVEY

Charlotte Roy
Forest Wildlife Populations and Research Group
Minnesota Department of Natural Resources
Grand Rapids, Minnesota
2 July 2020

SUMMARY OF FINDINGS

Greater prairie-chickens (*Tympanuchus cupido pinnatus*) were surveyed in 13 of 17 survey blocks during the spring of 2020. Observers located 39 booming grounds and counted 452 males and birds of unknown sex in the survey blocks, which is fewer than last year when all 17 blocks were surveyed. Including areas outside the survey blocks, observers located 98 booming grounds, 920 male prairie-chickens, and 84 birds of unknown sex throughout the prairie-chicken range. Estimated densities of 0.07 (0.04–0.10) booming grounds/km² and 11.6 (9.3–13.9) males/booming ground within the survey blocks were similar to densities during recent years and during the 10 years preceding modern hunting seasons (i.e., 1993–2002). However, in 2020, 4 of 7 peripheral survey blocks were not surveyed due to restrictions on nonessential fieldwork during the COVID-19 pandemic, and counts in these peripheral blocks are typically lower, which may have caused estimates of prairie-chicken densities this year to be biased high. Both population indices began to decline in 2008, with greater declines in booming grounds/km² and more stable estimates of males/booming ground.

INTRODUCTION

Historically, greater prairie-chicken (*Tympanuchus cupido pinnatus*) range in Minnesota was restricted to the southeastern portion of the state. However, dramatic changes in their range occurred in the 19th century as settlers expanded and modified the landscape with farming and forest removal, providing abundant food sources and access to new areas. As grass was lost from the landscape, prairie-chicken populations began to decline, their range contracted, and hunting seasons closed after 1942. In an attempt to bolster populations and expand prairie-chicken range, the Minnesota Department of Natural Resources (MNDNR) conducted a series of translocations in the Upper Minnesota River Valley during 1998-2006. Today, the beach ridges of glacial Lake Agassiz hold most of Minnesota's prairie-chickens, but their populations do extend southward (Figure 1). Hunting was re-opened using a limited-entry season in 2003, and <100 prairie-chickens are now harvested annually.

With the opening of the new hunting season, the DNR had a greater interest in the monitoring of prairie-chicken populations, which the Minnesota Prairie-Chicken Society (MPCS) had been coordinating since 1974. The DNR, in collaboration with MPCS members, began coordinating prairie-chicken surveys and adopted a standardized survey design in 2004. These surveys are conducted at small open areas called leks, or booming grounds, where male prairie-chickens display for females in the spring and make a low-frequency booming vocalization that can be heard for miles.

Prairie-chickens continue to be surveyed to monitor changes in population densities over time. However, density estimates can be costly and difficult to obtain, so instead we count individuals and make the assumption that changes in density are the primary source of variation in counts among years. If true, counts should provide a reasonable index to long-term trends in prairie-chicken populations. However, counts are also influenced by weather, habitat conditions, observer ability, and bird behavior among other factors, which make it difficult to make inferences over short periods of time (e.g., a few annual surveys) or from small changes in index values. Nevertheless, over long time periods and when changes in index values are large, inferences from prairie-chicken surveys are more likely to be valid.

METHODS

Cooperating biologists and volunteers surveyed booming grounds in 13 of 17 designated survey blocks in western Minnesota (Figure 2) during April and May. Each survey block was nonrandomly selected so that surveys would be conducted in areas where habitat was expected to be good (i.e., grassland was relatively abundant) and leks were known to occur. Each observer attempted to find and survey each booming ground repeatedly in his/her assigned block, which comprised 4 sections of the Public Land Survey (approximately 4,144 ha). Observers obtained multiple counts at each booming ground in the morning because male attendance at leks varies throughout the season and throughout the day.

During each survey, observers obtained visual counts of males, females, and birds of unknown sex from a distance with binoculars. Sex was determined through behavior; males display conspicuously, and females do not. If no birds were displaying during the survey period, then sex was recorded as unknown. When a reliable count could not be obtained visually because vegetation or topography prevented it, birds were flushed for counts and sex was recorded as unknown. Most birds for which sex was unknown were likely male because female attendance at leks is sporadic, and they are less conspicuous during lek attendance than displaying males. In the analysis, I used counts of males and unknowns at each booming ground but not females.

Leks were defined as having ≥ 2 males, so observations of single males were not counted as leks. Data were summarized by hunting permit area and spring survey block. The survey blocks were separated into a core group and a periphery group for analysis. The core group had a threshold density of approximately 1.0 male/km² during 2010, and was located proximally to other such blocks (Figure 2). I compared densities of leks and prairie-chickens to estimated densities from previous years.

I also encouraged observers to submit surveys of booming grounds outside the survey blocks because these observations may provide additional information that is helpful to prairie-chicken management. These data were included in estimates of minimum abundance of prairie-chickens. However, these data were not used in the analysis of lek and prairie-chicken densities because effort and methods may have differed from those used in the survey blocks.

In 2020, the COVID-19 pandemic affected the implementation of the prairie-chicken survey. Four survey blocks in the periphery of the survey region, survey blocks 1 and 2 in Otter Tail County and survey blocks 2 and 3 in Wilkin County, could not be surveyed due to cooperator restrictions on nonessential field work during the pandemic. Furthermore, the 3 Norman County survey blocks and 1 block in each of Becker and Wilkin Counties were surveyed later than usual because prairie-chicken surveys were not exempted from restrictions on field work for MNDNR Wildlife Staff until May 7. For the analysis, I only used the surveyed blocks to calculate densities for the periphery of the survey region.

RESULTS & DISCUSSION

Observers from MNDNR Section of Wildlife, the U.S. Fish & Wildlife Service, and The Nature Conservancy, as well as many unaffiliated volunteers counted prairie-chickens between 10 March and 15 May 2020. Observers located 98 booming grounds and observed 920 male prairie-chickens and 84 birds of unknown sex within and outside the survey blocks (Table 1). These counts represent a minimum number of prairie-chickens in Minnesota during 2020, but because survey effort outside of survey blocks is not standardized among years, these counts should not be compared among years or permit areas.

Within the standardized survey blocks, 452 males and birds of unknown sex were counted on 39 booming grounds during 2020 (Table 2). These counts are the lowest since the standardized survey began in 2004 when 1,566 males and 95 booming grounds were counted. This contrasts with the high count of 1,618 males and 114 booming grounds in 2007. Each lek was observed an average of 3.6 times (median = 2), with 28% of booming grounds observed just once. These counts should not be regarded as estimates of abundance because detection probabilities of leks and birds were not estimated. However, if detection probabilities and effort are similar among years in the survey blocks, then population indices based on survey block data can be used to monitor changes in abundance among years.

Densities of prairie-chickens in the 10 core survey blocks were 0.08 (0.05–0.12) booming grounds/km² and 11.4 (9.0–13.9) males/booming ground which is similar to recent years (Table 2, Figure 2). In the 3 of the 7 peripheral survey blocks that were surveyed in 2020, densities were 0.04 (0.02–0.06) booming grounds/km² and 12.6 (5.7–19.5) males/booming ground. These estimates were likely biased high by the lack of surveys in 4 peripheral survey blocks during the COVID-19 pandemic; these blocks usually have low densities. For all survey blocks, the density of 0.07 (0.04–0.10) booming grounds/km² during 2020 was similar to densities during recent years (Table 2, Figure 3) and the average of 0.08 (0.06–0.09) booming grounds/km² during the 10 years preceding recent hunting seasons (i.e., 1993–2002). Similarly, the density of 11.6 (9.3–13.9) males/booming ground in all surveyed blocks during 2020 was comparable to densities during recent years and similar to the average of 11.5 (10.1–12.9) males/booming ground observed during 1993–2002 (Table 2, Figure 3). However, due to a lack of surveys in 4 peripheral survey blocks during the pandemic, estimates for all survey blocks combined are likely biased high this year.

The observed densities are lower than the years preceding 2008 when CRP enrollments in the counties containing the survey blocks were highest. These changes in the population indices coincide with gains and losses in enrollments in the Conservation Reserve Program. More explicit examination of these patterns can be found in the recent publication, *Adkins, K., C. L. Roy, D. E. Anderson, R. Wright. 2019. Landscape-scale Greater Prairie-chicken Habitat Relations and the Conservation Reserve Program. The Journal of Wildlife Management DOI: 10.002/jwmg.21724*

ACKNOWLEDGMENTS

I would like to thank cooperators who conducted and helped coordinate the prairie-chicken survey, with a special thanks to those that stepped up to complete extra surveys this year when many were restricted from fieldwork during the pandemic. Cooperators with The Nature Conservancy included Brian Winter, Travis Issendorf, and volunteers Pat Beauzay, Matt Mecklenburg, Casey Reep, Derek Savage, and Carl Altenbernd; cooperators within MNDNR included Emily Hutchins, Rob Baden, Greg Henderson, Mark Palm, Michael Oehler, and Matt Morin; cooperators with the US Fish and Wildlife Service usually include Shawn Papon, Chad

Raitz, Ben Walker, Erin Lentz, Traver Fields, and Stacy Salvevold; and numerous additional volunteers participate, including Dan Svedarsky, Doug Wells, Jon Voz, Ross Hier, Phil Doll, and Doug Hedtke. This survey was funded in part by the Wildlife Restoration (Pittman-Robertson) Program W-69-S-13 Project #16. Lindsey Shartell provided assistance and comments which improved this report.

Table 1. Minimum abundance of prairie-chickens within and outside hunting permit areas in Minnesota during spring 2020. Lek and bird counts are not comparable among permit areas or years.

Permit Area	Area (km ²)	Leks	Males	Unknown ^a
803A	1,411	11	72	0
804A	435	0	0	0
805A	267	12	90	0
806A	747	8	29	45
807A	440	17	166	0
808A	417	21	269	0
809A	744	11	130	0
810A	505	3	36	5
811A	706	1	7	0
812A	914	3	23	0
813A	925	3	44	3
PA subtotal	7,511	90	866	53
Outside PAs ^b	NA ^c	8	54	31
Grand total	NA ^c	98	920	84

^a Unknown = prairie-chickens for which sex was unknown, but which were probably males.

^b Counts done outside permit areas (PA).

^c NA = not applicable because the area outside permit areas was not defined.

Table 2. Prairie-chicken counts within survey blocks in Minnesota during spring 2020, and change in counts compared to 2019.

Range ^b	Survey Block	Area (km ²)	2020		Change from 2019 ^a	
			Booming grounds	Males ^c	Booming grounds	Males ^c
Core	Polk 1	41.2	4	21	-1	-5
	Polk 2	42.0	3	35	0	3
	Norman 1	42.0	2	15	1	12
	Norman 2	42.2	1	17	-2	-3
	Norman 3	41.0	5	46	2	21
	Clay 1	46.0	8	125	1	-1
	Clay 2	41.0	3	39	1	-16
	Clay 3	42.0	6	56	2	-5
	Clay 4	39.0	0	0	-2	-7
	Wilkin 1	40.0	2	35	0	-3
	Core subtotal	415.0	34	389	2	-4
Periphery	Mahnomen	41.7	2	42	0	0
	Becker 1	41.4	2	15	-2	-2
	Becker 2	41.7	1	6	0	0
	Wilkin 2	NA	NA ^d	NA	NA	NA
	Wilkin 3	NA	NA	NA	NA	NA
	Otter Tail 1	NA	NA	NA	NA	NA
	Otter Tail 2	NA	NA	NA	NA	NA
	Periphery subtotal	124.8	5	63	-2	-2
	Grand total	539.8	39	452	0	-6

^a The 2019 count was subtracted from the 2020 count, so positive values indicate increases.

^b Survey blocks were categorized as within the core or periphery of the Minnesota prairie-chicken range based upon bird densities and geographic location.

^c Includes birds recorded as being of unknown sex but excludes lone males.

^d NA = not applicable because 4 survey blocks were not completed in 2020 due to cooperator restrictions on nonessential field work during the COVID-19 pandemic.

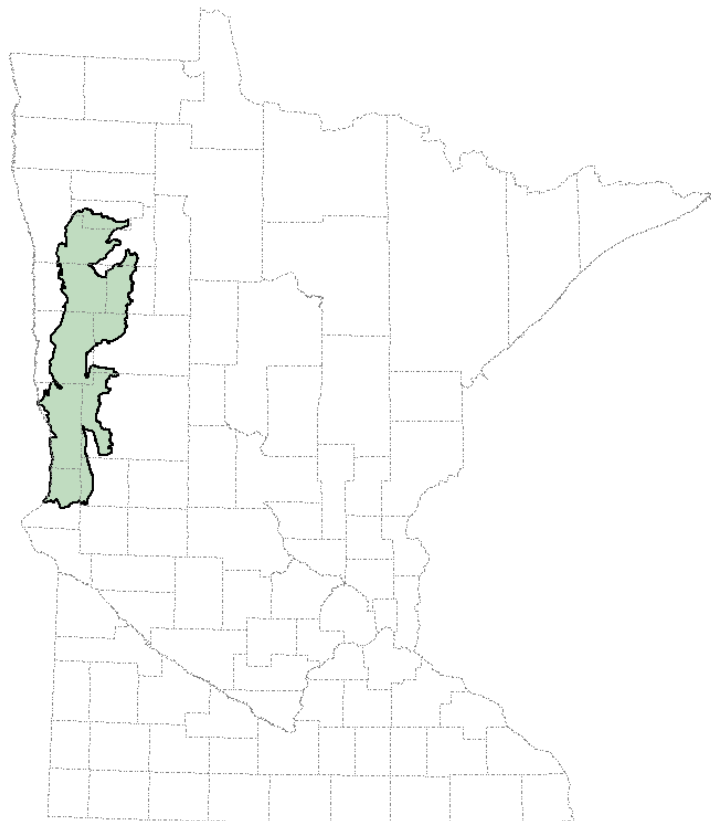


Figure 1. Primary greater prairie-chicken range in Minnesota (shaded area) relative to county boundaries. The range boundary was based on Ecological Classification System Land Type Associations and excludes some areas known to be occupied by prairie-chickens.

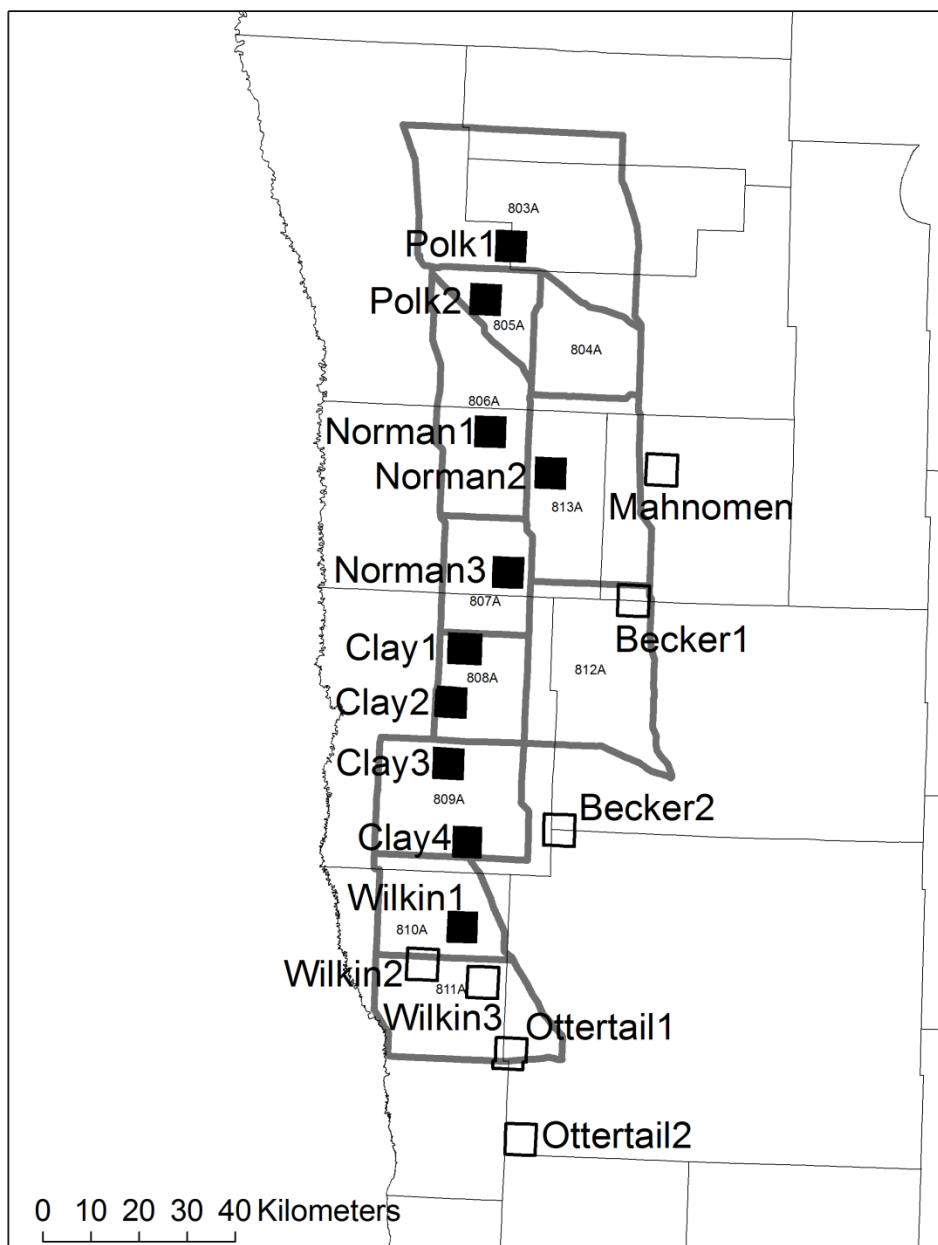


Figure 2. Prairie-chicken lek survey blocks (41 km², labeled squares) and hunting permit areas (thick grey lines) in western Minnesota. Survey blocks were either in the core (black) or periphery (white) of the range with a threshold of 1.0 male/km² in 2010, and were named after their respective counties (thin black lines). Permit areas were revised in 2013 to eliminate 801A and 802A, modify 803A, and add 812A and 813A. See previous reports for former permit area boundaries.

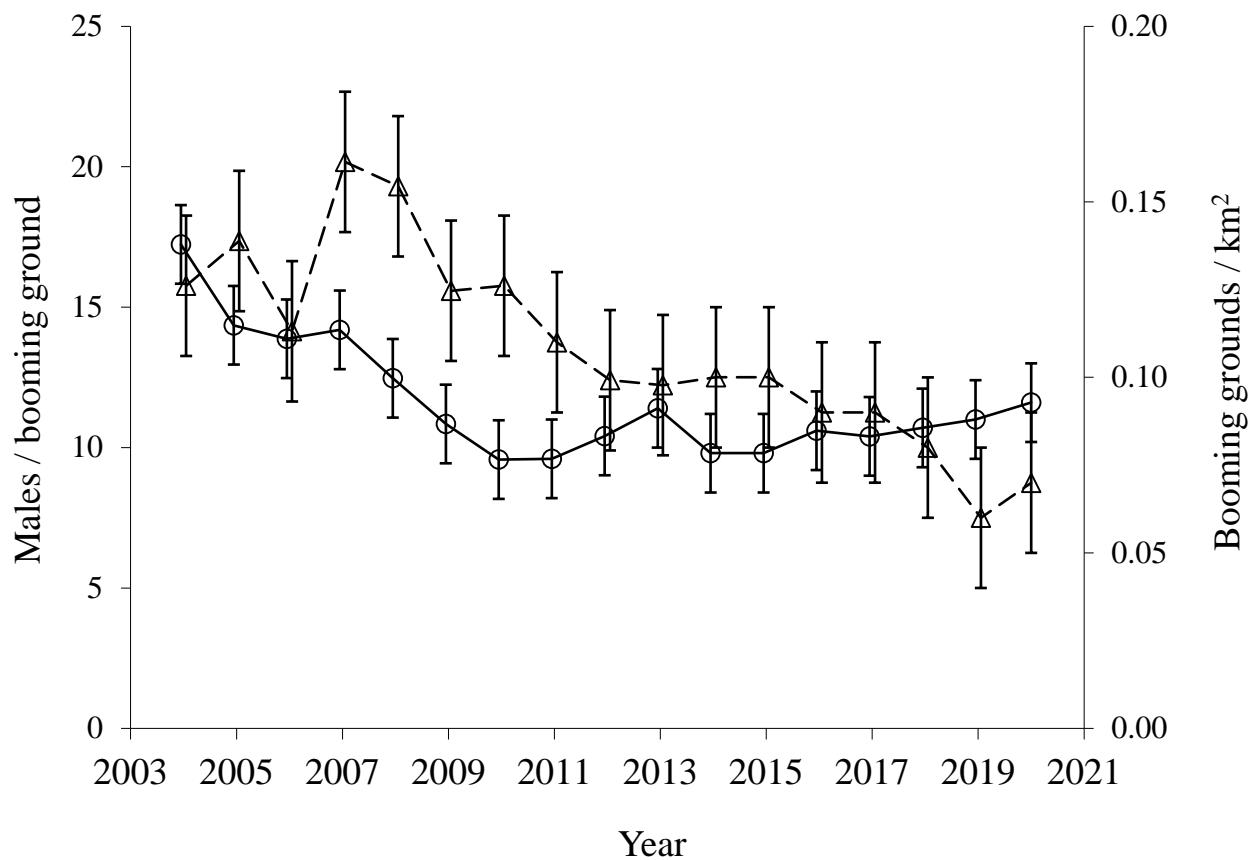


Figure 3. Mean prairie-chicken males/booming ground (circles connected by solid line) and booming grounds/km² (triangles connected by dashed line) in survey blocks in Minnesota with 95% confidence intervals.