2023 MINNESOTA PRAIRIE-CHICKEN POPULATION SURVEY

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SUMMARY OF FINDINGS

Greater prairie-chickens (*Tympanuchus cupido pinnatus*) were surveyed in all 17 survey blocks during the spring of 2023. Observers located 51 booming grounds and counted 594 males and birds of unknown sex in the survey blocks. Including areas outside the survey blocks, observers located 115 booming grounds, 1,051 male prairie-chickens, and 115 birds of unknown sex. Estimated densities of 0.07 (0.05–0.10) booming grounds/km^2 and 11.6 (9.5–13.8) 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), but lower than the peak in booming grounds/km^2 in 2007 when CRP enrollments were also the highest.

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 European colonists expanded and modified the landscape with farming and forest removal, providing abundant food sources for priairie-chickens and access to new areas. Later, as grass continued to be lost from the landscape, prairie-chicken populations began to decline, their range contracted to western Minnesota, 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 unsuccessful 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 over a mile.

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 on 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/km^2 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 2021, MPCS requested that sharp-tailed grouse (*Tympanuchus phasianellus*) observed during prairie-chicken surveys be included in this report because of concerns that sharp-tailed grouse are expanding into range previously occupied primarily by the prairie-chicken. Prior to the survey season, I asked observers to include observations of sharp-tailed grouse with their data.

RESULTS & DISCUSSION

Observers from MNDNR Section of Wildlife, the U.S. Fish & Wildlife Service (USFWS), and The Nature Conservancy (TNC), as well as many unaffiliated volunteers counted prairie-chickens between 7 April and 11 May 2023. Observers located 115 booming grounds and observed 1,051 male prairie-chickens and 115 birds of unknown sex within and outside the survey blocks (Table 1). These counts represent a minimum number of prairie-chickens in Minnesota during

2023, 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, 594 males and birds of unknown sex were counted on 51 booming grounds during 2023 (Table 2). This contrasts with the high count of 1,618 males and 114 booming grounds in 2007. Each lek was observed an average of 2.2 times (median = 2), with 35% 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 (0.05–0.11) booming grounds/km^2 and 12.6 (9.9–15.3) males/booming ground (Figure 3). In the peripheral survey blocks, densities were 0.06 (0.01–0.10) booming grounds/km^2 and 9.7 (6.3–13.1) males/booming ground. For all survey blocks, the density of 0.07 (0.05–0.10) booming grounds/km^2 during 2023 was similar to densities during recent years (Figure 3) and the average of 0.08 (0.06–0.09) booming grounds/km^2 during the 10 years preceding recent hunting seasons (i.e., 1993–2002). Similarly, the density of 11.6 (9.5–13.8) males/booming ground in all surveyed blocks during 2023 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 (Figure 3).

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. Changes in the quantity of grassland on the landscape impacts prairie-chicken populations. 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.*

Prairie-chicken survey cooperators submitted reports of sharp-tailed grouse observed during prairie-chicken surveys in 2023. In Polk County, 152 sharp-tailed grouse were counted at 13 sharp-tailed grouse dancing grounds. Additionally, 1 sharptail-chicken hybrid was observed at each of 2 different prairie-chicken booming grounds. In Norman County, a sharp-tailed grouse lek with 13 males and 3 females was observed. In Clay County, 2 sharp-tailed grouse were observed at 1 prairie-chicken booming ground and 3 hybrids were counted on 2 booming grounds (1 and 2 hybrids, respectively). In Mahnomen County, 2 sharp-tailed grouse and a sharptail-chicken hybrid were at a booming ground. In Wilkin county, 1 sharp-tailed grouse was observed at a prairie-chicken booming ground. Research staff observed additional hybrids in Mahnomen (2), Norman (3), and Polk counties (2) as part of a research project.

ACKNOWLEDGMENTS

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Table 1. Minimum abundance of prairie-chickens within and outside hunting permit areas in Minnesota during spring 2023. Lek and bird counts are not comparable among permit areas or years.

Permit Area	Area (km^2)	Leks	Males	Unknown[a]
803A	1,411	9	61	0
804A	435	0	0	0
805A	267	15	123	0
806A	747	10	53	18
807A	440	16	159	6
808A	417	19	258	0
809A	744	12	156	0
810A	505	7	70	24
811A	706	5	41	10
812A	914	9	58	10
813A	925	4	24	0
PA subtotal	7,511	106	1003	68
Outside PAs[b]	NA[c]	9	48	47
Grand total	NA[c]	115	1051	115

[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 2023, and change in counts compared to 2022.

			2023		Change from 2022[a]	
Range[b]	Survey Block	Area (km^2)	Booming grounds	Males[c]	Booming grounds	Males[c]
Core	Polk 1	41.2	1	14	0	3
	Polk 2	42.0	3	36	-1	4
	Norman 1	42.0	2	13	0	2
	Norman 2	42.2	3	16	1	4
	Norman 3	41.0	3	36	-2	-29
	Clay 1	46.0	9	106	0	-62
	Clay 2	41.0	3	65	-1	-2
	Clay 3	42.0	4	47	-2	-31
	Clay 4	39.0	2	22	2	22
	Wilkin 1	40.0	4	74	1	41
	Core subtotal	415.0	34	429	-2	-48
Periphery	Mahnomen	41.7	2	33	-1	-19
	Becker 1	41.4	8	64	4	29
	Becker 2	41.7	1	4	-1	1
	Wilkin 2	41.7	2	8	0	-5
	Wilkin 3	42.0	2	29	0	12
	Otter Tail 1	41.0	1	7	0	1
	Otter Tail 2	40.7	1	20	1	NA
	Periphery subtotal	290.6	17	165	3	39
Grand total		705.5	51	594	1	-9

[a] The 2022 count was subtracted from the 2023 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.

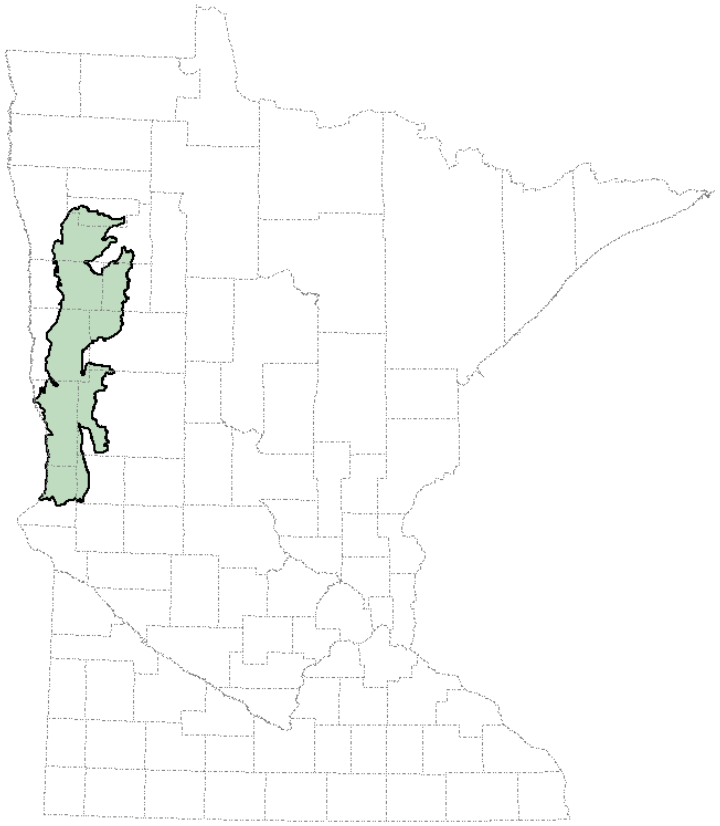

Figure 1. Primary greater prairie-chicken range in Minnesota (shaded area) relative to county boundaries. The range boundary was based on Ecological Classification System Land Type Associations and excludes some areas known to be occupied by prairie-chickens.

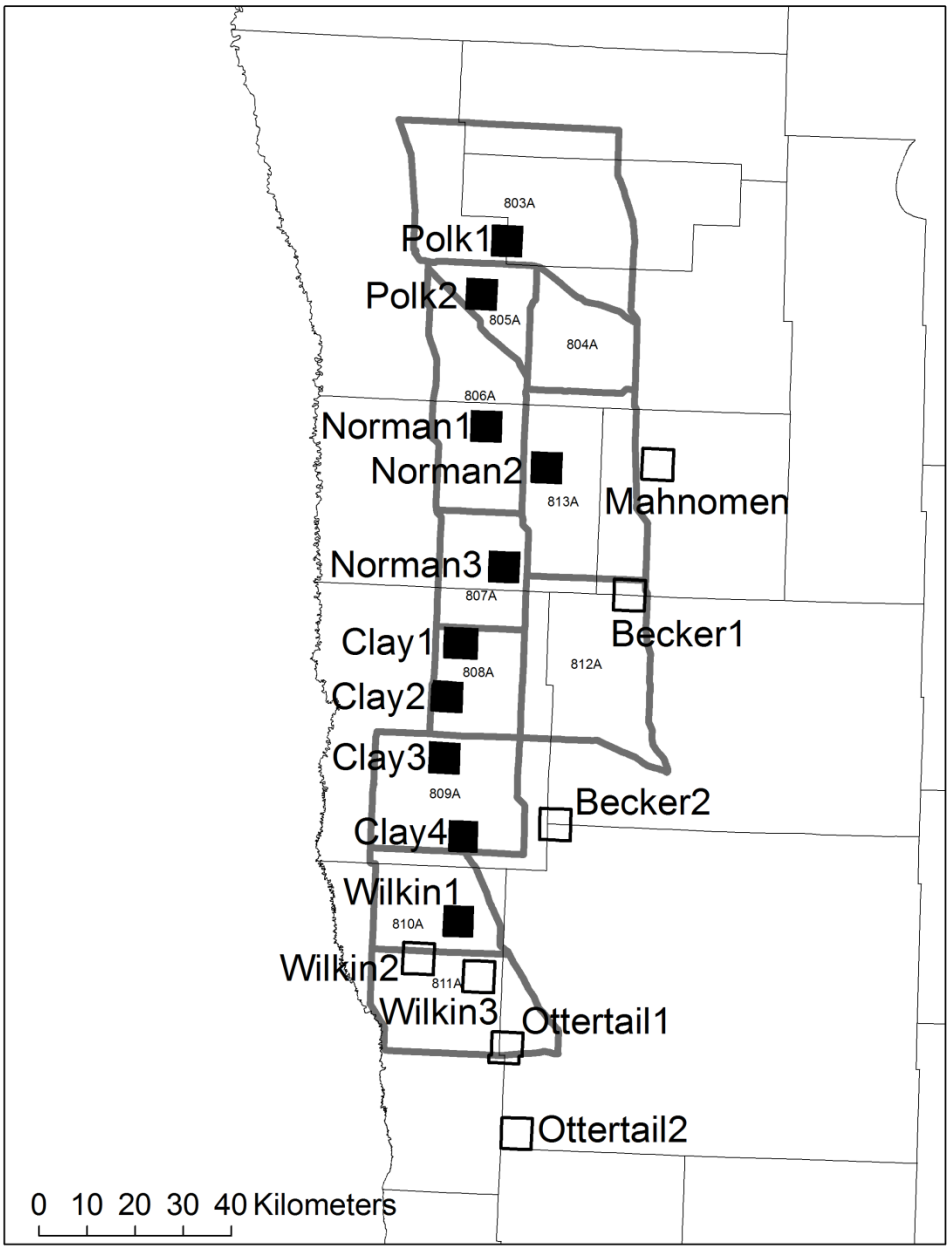

Figure 2. Prairie-chicken lek survey blocks (41 km^2, labeled squares) and hunting permit areas (thick grey lines) in western Minnesota. Survey blocks were either in the core (black) or periphery (white) of the range with a threshold of 1.0 male/km^2 in 2010, and were named after their respective counties (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.

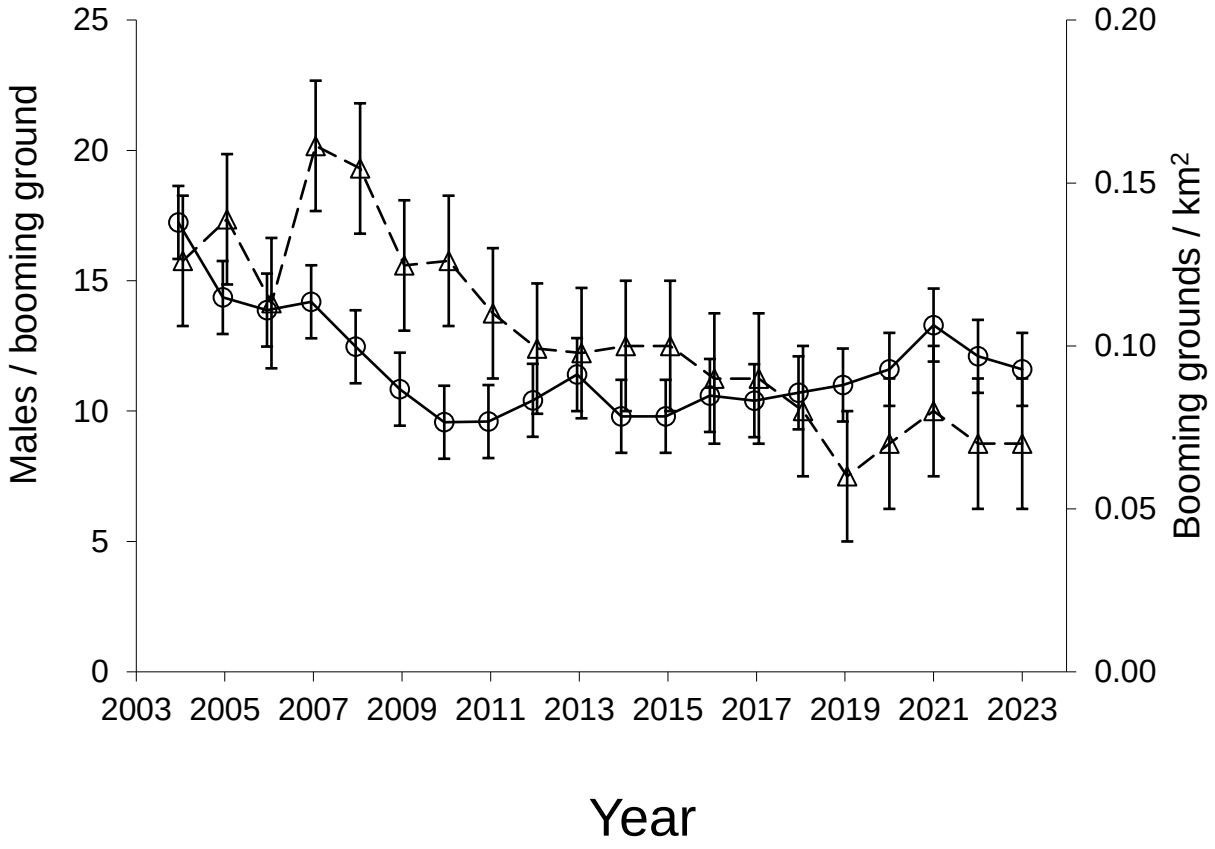

Figure 3. Mean prairie-chicken males/booming ground (circles connected by solid line) and booming grounds/km^2 (triangles connected by dashed line) in survey blocks in Minnesota with 95% confidence intervals.