



# MONITORING POPULATION TRENDS OF ELK IN NORTHWESTERN MINNESOTA - 2025

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## INTRODUCTION

Historically, elk inhabited much of Minnesota (O’Gara and Dundas 2002) but today are limited to three relatively small herds found in Kittson, Roseau, Marshall, and Beltrami counties in the northwestern portion of the state (Figure 1). Row crops are a dominant land use in this part of the state and subsequently, there is potential for crop depredation caused by elk. In response to concerns from agricultural producers, the 2016 Minnesota Legislature passed legislation limiting the size of the northwest elk herds ([2016 Minnesota Statutes Section 97B.516](#)). Specifically, the Grygla herd must be managed for 30-38 elk, the Kittson County herd for 50-60 elk, and the Caribou-Vita herd for 150-200 elk ([Interim Strategic Management Plan for Elk 2016-2019](#)). A 2024 amendment ([Chapter 116, sec 56](#)), to existing statute allows for an increase within the Kittson Central herd, from a 2023 population estimate of 75 elk up to a total of 98 elk, to allow for genetic diversification and herd health. The legislation further directs the Minnesota Department of Natural Resources (MNDNR) to work with the “Grygla and Kittson elk working groups, private landowners, local units of government, and Minnesota tribal nations to develop a plan to enhance the size and range of Minnesota’s elk population and provide increased recreational opportunities while maintaining a positive existence for the long-term management of the population.”

Since the mid-1990s, MNDNR personnel have conducted an annual aerial elk survey from mid-January to mid-March in northwest Minnesota. Our primary objective is to obtain minimum elk counts within each herd. MNDNR staff use this data to monitor long-term trends, document changes in spatial distribution and sex ratios, and help set harvest quotas for potential hunting seasons.

## METHODS

We estimated elk populations in survey blocks encompassing the winter range of each herd. The Grygla survey block covers 144 mi<sup>2</sup> in Marshall and Beltrami counties and includes one herd of elk. The Kittson Central survey block comprises 183 mi<sup>2</sup> in Kittson County and includes two sub-herds of elk (Kittson Central North and Kittson Central South). The Caribou-Vita survey block incorporates approximately 35 mi<sup>2</sup> in Kittson and Roseau Counties and 180 mi<sup>2</sup> in Manitoba and includes at least two subherds, with one that frequently alternates on either side of the United States/Canada border. In general, the Caribou-Vita survey is only conducted in years when MNDNR staff can coordinate with Manitoba Conservation staff to complete concurrent surveys on both sides of the border. However, MNDNR Division of Enforcement (ENF) coordinated with US and Canadian border patrol authorities to allow safe flights across the border into Manitoba airspace in 2023 and 2025.

During all surveys, we used two Cessna 185 fixed-wing aircraft and attempted to maintain flight altitude at 350 ft above ground level (AGL) and airspeed at 85-90 mi/hr. The pilot and two observers within each aircraft searched for elk along parallel, east-west transects spaced at 0.2-mi intervals. When an elk was sighted, we left the transect line and circled the observed animal(s) to determine group size and classify antlerless (cow, calf) and antlered animals. We did not attempt to differentiate between cows and calves because differentiation is difficult under existing flight protocols. Antlered elk were classified as either adult (branch-antlered) bulls or spike bulls. We used a real-time, moving-map software program (DNRSurvey; Haroldson et al. 2015), coupled to

a global positioning system receiver and a tablet computer, to guide transect navigation and record survey data and aircraft flight paths directly to ArcGIS (Environmental Systems Research Institute, Inc., Redlands, CA) shapefiles. To maximize sightability, we completed surveys during winter when snow cover measured at least 8 in.

We did not account for visibility bias in the annual elk surveys. However, during 2014 to 2016, we estimated detection rate using a modified double-sampling method (Gasaway et al. 1986) to determine if our fixed-wing sampling protocol was adequate for enumerating elk. The location of each elk group sighted during the fixed-wing survey, generalized to the corresponding Public Land Survey (PLS) section, was relayed to an awaiting helicopter flight crew. This crew then resurveyed each targeted PLS section, plus the 8 surrounding sections, to obtain a second count of animals. Flight protocol included transect spacing of 0.2 mi, flight altitude of 200 ft AGL, and airspeed of 40-50 mi/hr. We used DNRSurvey (Haroldson et al. 2015) to record survey data. As a result, we observed 40 of 48 elk groups (mean = 0.83; range: 0.82-0.85) and 301 of 322 individual animals (mean = 0.93; range: 0.87-0.98) with the fixed-wing crew compared to the helicopter crew (Table 1).

## **RESULTS**

We completed surveys within the Grygla and Kittson Central survey blocks but only within a portion of the Caribou-Vita survey block (Figure 1). Because the aerial surveys were not completed in 2024 due to insufficient snow cover, it was critical we obtain elk numbers in 2025 to inform elk-related management decisions. In 2025, snow depths did not meet the 8 in minimum, but instead averaged 5 inches across the Grygla block and ranged from 5-7 inches in the Kittson Central and Caribou-Vita blocks. Temperatures ranged from a low of -16°F to a high of 13°F with mostly sunny to mostly cloudy skies.

### **Grygla Survey Block**

This survey was conducted on 5 January and required 10.8 survey hours. We observed 24 elk, including 18 antlerless animals and 6 adult bulls (Table 2). We observed elk in 2 groups with a mean of 12 elk/group.

### **Kittson Central Survey Block**

This survey was conducted during 6-7 January and required 15.1 survey hours. We observed 75 elk, including 63 antlerless animals, 1 spike bull, and 11 adult bulls (Table 3). We observed elk in 6 groups with a mean of 12.5 elk/group.

- The Kittson Central North subgroup had 32 total elk (30 antlerless, 1 spike bull, 1 adult bull).
- The Kittson Central South subgroup had 43 total elk (33 antlerless, 10 adult bulls).

### **Caribou-Vita Survey Block**

This survey began on 7 January and was terminated after 8.3 survey hours due to mechanical issues and poor weather conditions. We completed 37% of the survey block, including 100% of the Minnesota portion and 24% of the Manitoba portion, which included the first 4.75 miles north of the Manitoba border. (Figure 1). We observed 134 elk, including 128 antlerless animals, 2 spike bulls, and 4 adult bulls (Table 4). We observed elk in 7 groups with a mean of 19.1 elk/group. All animals were observed on the Manitoba side of the border.

## **DISCUSSION**

Detection rate estimates from 2014 to 2016 indicate detectability of elk using a fixed-wing aircraft is reasonably constant across years and the survey crew is observing a high proportion of animals present during the survey. Although the likelihood of missing animals increases as group size decreases, current survey design and protocols provide a reasonably good opportunity to

enumerate a minimum count of elk within each survey area. In turn, these minimum counts provide baseline information needed on the elk population, which is necessary given that the state requires that elk be maintained at certain population levels. Although minimum counts currently provide adequate information given our current elk management goals, methodology may need to be altered if Minnesota's management goals change (e.g., manage to increase elk numbers).

Several logistical factors affect aerial survey efficiency and accuracy. For example, inclement weather, aircraft mechanical problems, and staffing issues (e.g., crew availability) can result in unexpected flight delays. These flight delays in turn can lead to counting errors, such as double-counting or undercounting of animals, depending upon animal movement to/from surveyed and non-surveyed areas. Further, elk are sometimes observed post-survey. In 2023, for example, a group of 24 elk (2 spike bulls, 22 antlerless) was observed in the Kittson Central survey block 5 days post-survey. Based on historic survey data, we were confident these animals had not been counted during the initial survey and thus we increased the total count for this herd from 51 to 75 animals. Given the Kittson Central herd is managed for 50-60 animals, an initial count of 51 elk would have drastically changed the tag allocation for the 2023 hunt. To address these concerns with flight efficiency and accuracy, we incorporated a second flight crew in 2025. Doubling our sampling effort decreases the overall time to complete surveys in our three sampling blocks, reducing the potential for flight delays and impact of animal movement.

A 2025 review of previous northwest elk aerial survey reports identified some mistakes in the aerial survey observation tables. In brief, some elk observed just outside of the formal survey area were reported as counted during the survey. Although those observations provide valuable information about these small herds, including those animals in the formal survey was inconsistent with aerial survey protocols. Those mistakes have been rectified and will be accurate moving forward, but we acknowledge there may be discrepancies with previous reports.

## **ACKNOWLEDGMENTS**

Special thanks to all those that helped with the survey this year, especially the fixed-wing pilots Tim Gray and Charles (Chuck) Scott, Doug Franke (Thief River Falls Wildlife supervisor), Kyle Arola (Thief Lake Area Wildlife Supervisor), Jason Wollin (Karlstad Area Wildlife Supervisor), and Matt Morin (Erskine Assistant Area Wildlife Supervisor). This work was funded in part through the Federal Aid in Wildlife Restoration Act.

## **LITERATURE CITED**

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**Table 1.** Detection rate metrics collected from fixed-wing and rotary-wing aircraft during winter elk surveys in northwestern Minnesota, 2014-2016.

Year	# Groups detected (fixed-wing)	# Groups detected (helicopter)	Proportion detected (fixed-wing)	# Animals detected (fixed-wing)	# Animals detected (helicopter)	Proportion detected (fixed-wing)
2014	15	18	0.83	94	108	0.87
2015	11	13	0.85	126	131	0.96
2016	14	17	0.82	81	83	0.98
Total	40	48	0.83 <sup>a</sup>	301	322	0.93 <sup>a</sup>

<sup>a</sup>Mean proportion of elk groups detected, 2014-2016.

**Table 2.** Grygla Block aerial survey observations from 2014 to 2025 in northwestern Minnesota, USA.

Year	Spike Bull	Adult Bull	Antlerless	Total Elk	Antlered:Antlerless Ratio	Number of Groups	Group Size (mean)	Ground Size (range)
2014 <sup>a</sup>	2	4	14	20	0.43	3	6.7	1-16
2015 <sup>a</sup>	3	6	9	18	1.00	4	4.5	1-12
2016 <sup>a</sup>	2	9	10	21	1.10	7	3.0	1-10
2017	4	6	7	17	1.43	3	5.7	2-8
2018	2	6	7	15	1.14	5	3.0	1-7
2019	1	10	8	19	1.38	4	4.8	1-8
2020	1	9	14	24	0.71	5	4.8	1-14
2021 <sup>b</sup>	-	-	-	-	-	-	-	-
2022	2	12	15	29	0.93	5	5.8	1-18
2023 <sup>c</sup>	1	10	13	24	0.85	5	4.8	1-17
2024 <sup>d</sup>	-	-	-	-	-	-	-	-
2025	0	6	18	24	0.33	2	12.0	5-19

<sup>a</sup>Counts recorded from helicopter flights.

<sup>b</sup>Survey not completed due to MNDNR COVID-19 restrictions.

<sup>c</sup>Outside of the aerial survey boundaries, 5 additional antlerless elk were observed approx.1 mile west of survey block. These animals were included when making season-setting decisions. In previous editions of this survey report, these additional elk were included in the "Total Elk" column; however, this table is intended to document elk specifically counted within the official survey parameters.

<sup>d</sup>Survey not completed due to insufficient snow cover.

**Table 3.** Kittson Central Block aerial survey observations from 2014 to 2025 in northwestern Minnesota, USA.

Year	Spike Bull	Adult Bull	Antlerless	Total Elk	Antlered:Antlerless Ratio	Number of Groups	Group Size (mean)	Ground Size (range)
2014 <sup>a</sup>	3	14	20	37	0.85	8	4.6	1-17
2015 <sup>a</sup>	2	16	16	34	1.13	7	4.9	1-13
2016 <sup>a</sup>	6	12	34	52	0.53	4	13.0	2-21
2017	2	14	45	61	0.36	6	10.2	1-31
2018	5	13	57	75	0.32	5	15.0	1-41
2019	11	22	61	94	0.54	8	11.8	1-39
2020	6	27	70	103	0.47	11	9.4	3-28
2021 <sup>b</sup>	-	-	-	-	-	-	-	-
2022 <sup>c</sup>	5	28	51	84	0.65	8	10.5	3-28
2023 <sup>d</sup>	2	21	28	51	0.82	5	10.2	2-26
2024 <sup>e</sup>	-	-	-	-	-	-	-	-
2025	1	11	63	75	0.19	6	12.5	1-31

<sup>a</sup>Counts recorded from helicopter flights.

<sup>b</sup>Survey not completed due to MNDNR COVID-19 restrictions.

<sup>c</sup>Outside of the aerial survey boundaries, 6 additional adult bull elk were observed approx. 1 mile east of survey block. These animals were included when making season-setting decisions. In previous editions of this survey report, these additional elk were included in the "Total Elk" column; however, this table is intended to document elk specifically counted within the official survey parameters.

<sup>d</sup>Outside of the aerial survey timeframe, 2 spike bulls and 22 antlerless elk were observed 5 days post-survey; observers were confident they had not been previously counted. These animals were included when making season-setting decisions. In previous editions of this survey report, these additional elk were included in the "Total Elk" column; however, this table is intended to document elk specifically counted within the official survey parameters.

<sup>e</sup>Survey not completed due to insufficient snow cover.

**Table 4.** Caribou-Vita Block (Minnesota and Manitoba combined) aerial survey observations from 2014 to 2025 in northwestern Minnesota, USA and southern Manitoba, CA.

Year	Spike Bulls		Adult Bull		Antlerless		Total Elk		Antlered:Antlerless Ratio		Number of Groups		Group Size (mean)		Group Size (range)	
	MN	MB	MN	MB	MN	MB	MN	MB	MN	MB	MN	MB	MN	MB	MN	MB
2014 <sup>a</sup>	10	-	7	-	34	-	51	-	0.5	-	7	-	7.3	-	1-28	-
2015 <sup>a</sup>	5	-	17	-	57	-	79	-	0.25	-	2	-	39.5	-	9-70	-
2016 <sup>a</sup>	0	-	6	-	4	-	10	-	1.5	-	6	-	1.8	-	1-3	-
2017	0	6	1	24	0	133	1	163	-	0.23	1	-	1.0	-	1-1	-
2018	1	5	6	17	0	104	7	126	-	0.28	1	-	7.0	-	7-7	-
2019 <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2020 <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2021 <sup>c</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2022 <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	5	4	12	19	79	108	96	131	0.22	0.21	7	10	13.7	13.1	1-33	1-35
2024 <sup>d</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2025 <sup>e</sup>	0	2	0	4	0	128	0	134	0	0.05	0	7	0	19.1	0	3-65

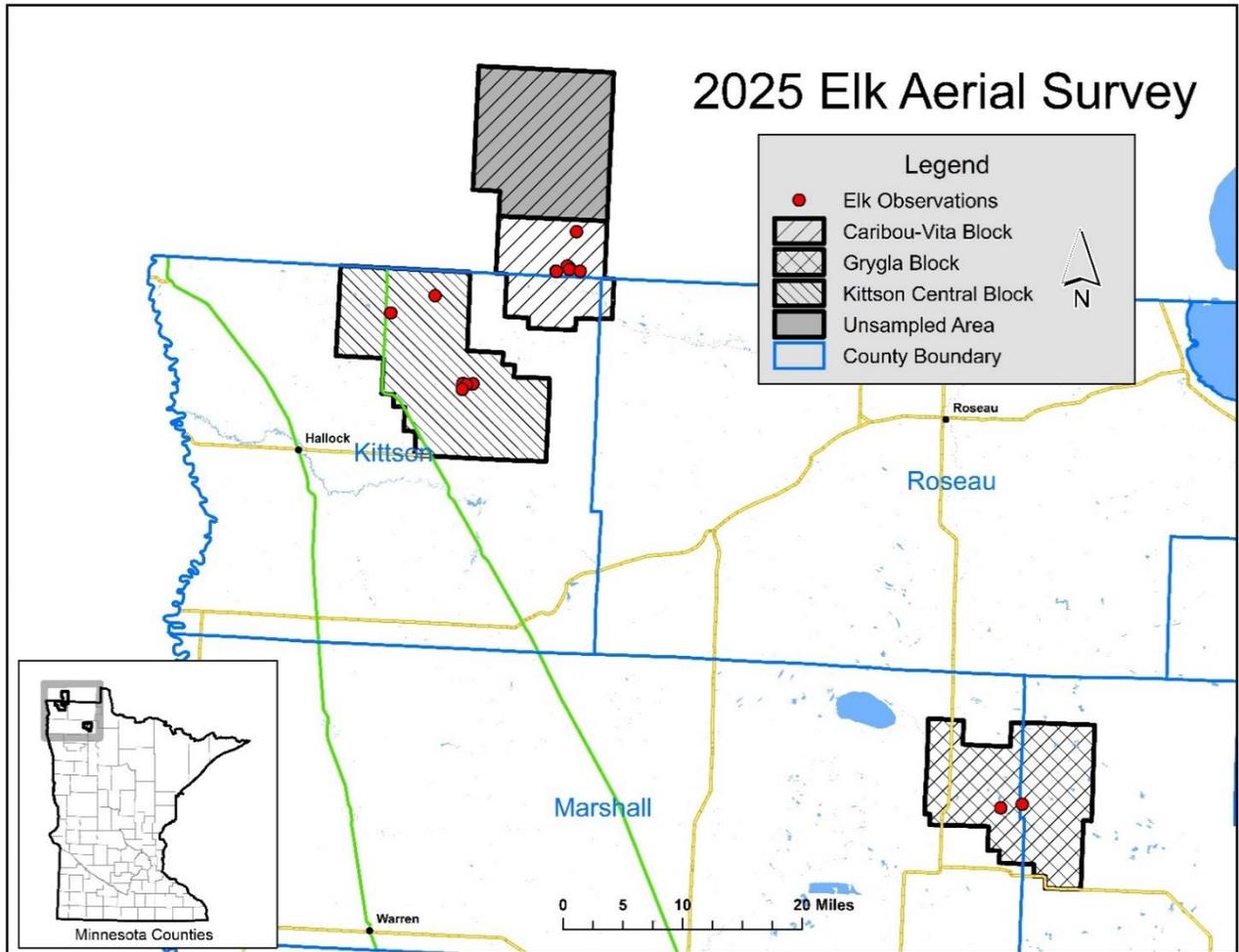
<sup>a</sup>Counts recorded from helicopter flights.

<sup>b</sup>Survey not completed because Manitoba Conservation was unable to fly Canadian side of border.

<sup>c</sup>Survey not completed due to MNDNR COVID-19 restrictions.

<sup>d</sup>Survey not completed due to insufficient snow cover.

<sup>e</sup>Survey was partially completed and ultimately halted due to airplane mechanical issues.



**Figure 1.** Elk observations during 2025 aerial survey within the Caribou-Vita, Grygla, and Kittson Central survey blocks, northwestern Minnesota. Shaded area within the Caribou-Vita block indicates portion not flown due to airplane mechanical problems and weather issues. Red dots indicate locations where elk were observed.