Takhini Elk Herd Survey
Early-winter 2024

December 2025

Takhini Elk Herd Survey, Early-winter 2024

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Summary

- In November and December 2024, we conducted a survey of the Takhini elk herd using fixed-wing drones equipped with infrared and colour cameras. The purpose of the survey was to estimate the abundance and composition of the herd.

- The drones located a total 270 elk composed of 36 mature bulls, 21 yearling bulls, 132 cows, 55 calves and 26 unclassified elk.

- Based on survey results and information from collared elk, we estimate the population size at 270 animals, with an upper bound of about 300.

- The observed demographic ratios were a maximum of 27 mature bulls per 100 cows and 42 (35-52) calves per 100 cows.

- Since the first legislated harvest in 2009, a total of 211 elk have been harvested from the Takhini herd by licensed hunters.

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Introduction

Background

Elk (*Cervus canadensis*) were first reintroduced to southern Yukon in the 1950s, with additional releases in the 1990s, mainly from Elk Island National Park. Elk were first reported in the Takhini Valley in the late 1960s, occupying habitat opened up by a 1958 fire. The Takhini herd ranges west of Whitehorse, with its core range between the Takhini River bridge and the Mendenhall subdivision.

For several decades after introduction, monitoring was limited and numbers appeared low, with the herd remaining under 100 animals until the early 1990s. Following new releases between 1989 and 1994, numbers increased, and by 2008 the herd was estimated at about 200 elk. Radio collaring began in 2007 to support monitoring and harvest planning.

During the same period, winter ticks (*Dermacentor albipictus*) were confirmed on collared elk, raising concerns about spread to moose and caribou. In 2008–2009, the Department of Environment penned cow elk in spring to reduce tick transmission. This program was abandoned when reports of winter ticks on moose and caribou at more northern latitudes were confirmed. However, higher calf recruitment during penning led to concerns about herd growth. The Government of Yukon responded by establishing a Technical Committee, committing to harvest sharing with First Nations, and initiating the first licensed elk hunt in fall 2009 (excluding the one-time issuance of 2 seals in the mid 1980s). Since then, annual harvest has been adaptively managed, and winter tick levels continue to be monitored through hunter-submitted and road-killed hides.

Elk are currently managed under the *Management Plan for Elk in Yukon* (Environment Yukon 2016) which replaced the earlier *Management for Elk in the Yukon* (Government of Yukon 2008) and the *Management Plan for the Takhini Valley Elk Population* (Government of Yukon 1990). The 2016 plan was created in response to concerns from the agriculture community over increasing conflict between elk and agriculture.

Previous surveys

The first recruitment survey following the penning program was conducted in 2011. Since then, late-winter recruitment surveys have been carried out annually to monitor herd age and sex composition, calf survival and to obtain a rough approximation of herd size between formal, infrequent population estimates (Table 1). Prior to the 2024 aerial drone survey, three different types of population surveys were completed: a late-winter mark-resight (LWMR) survey in 2011, a modified late-winter mark-resight (MLWMR) survey in 2013, and in 2021 an early-winter minimum count (EWMC) survey with a 9% sightability correction (SC) based on the average detection rate used for moose surveys (Table 1).

Table 1. Summary of past recruitment and population surveys of the Takhini elk herd from 2011 to March 2024.

Year	Late-winter recruitment surveys Recruitment (calves/100 cows)	Population surveys Type of population survey	Sex ratio (mature bulls/100 cows)	Population estimate (90% CI)	Total bulls (includes yearlings) (90% CI)	Total cows (90% CI)
2011	13	LWMR[1]	24[4]	275 (247-313)	47 (37-65)	193 (173-221)
2012	-					
2013	24	MLWMR[2]	41[4]	230	58	143 (119-184)
2014	28					
2015	36					
2016	19					
2017	13					
2018	20					
2019	12					
2020	10					
2021	10	EWMC+SC[3]	17	247-269	40-44	173-189
2022	41					
2023	9					
2024	18					

[1] LWMR: Late-winter mark-resight survey. We used program NOREMARK (White 1996) to model data from 4 resight flights based on 25 collared cows and 24 elk marked with paintballs.

[2] MLWMR: Modified late-winter mark-resight survey. We used program NOREMARK (White 1996) to model cow data from 3 resight flights based on 20 collared cows. Bull numbers were estimated based on the average sex ratio from resight flights.

[3] EWMC+SC: Early-winter minimum count plus sightability correction. We used the number of observed elk as the lower estimate for the population and calculated the upper estimate based on a 9% sightability correction.

[4] Yearling bulls included in the sex ratio.

Study area

The survey was conducted in the Takhini elk range, located immediately northwest of Whitehorse, Yukon (Figure 1). The survey extent encompasses almost the entire November range of the elk based on VHF and GPS collar location data and extends from the agricultural area along the North Klondike highway to the cut-off for Kusawa Lake.

The survey area encompasses a broad mix of forested uplands, river flats and rolling foothills and is characterized by a distinctive agriculture–wilderness matrix. Small farms, larger agricultural producers, and rural residential properties are scattered throughout the valley bottom. This mosaic creates a patchwork landscape where human-modified and natural habitats intersect often leading to overlap between human activities and wildlife use of the land. The valley is also used extensively by local residents for recreational activities including hunting, hiking, skiing and dog mushing.

The Takhini elk range lies within the Boreal Cordillera ecozone, characterized by a mosaic of white spruce (*Picea glauca*), trembling aspen (*Populus tremuloides*) and lodgepole pine (*Pinus contorta*) forests, interspersed with shrub communities and open meadows. Elevations in the area range from approximately 600 m in the valley bottom to over 1,500 m in the surrounding mountains. Portions of the Takhini Valley fall within the Traditional Territories of the Kwanlin Dün First Nation, the Ta'an Kwäch'än Council and the Champagne and Aishihik First Nations.
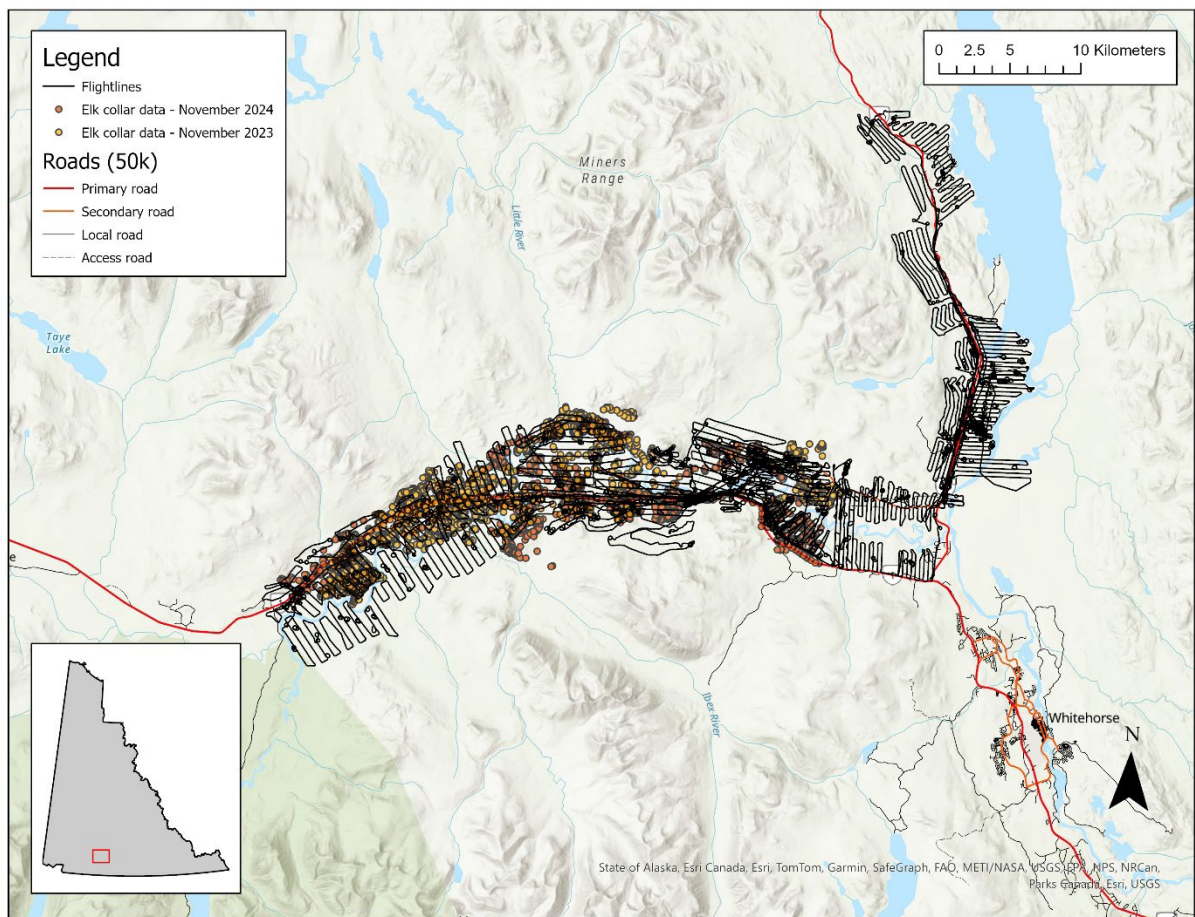
Figure 1. Takhini elk collar data from 16 elk in November 2023 and 9 elk in November 2024 with flightlines from the 2024 early-winter drone survey.

Methods

We conducted this survey from November 6 to December 1, 2024, using 2 fixed-wing SW-117 remotely piloted aircraft system (RPAS) drones equipped with high-resolution infrared and colour cameras (Superwake Inc., North York, Ontario; Figure 2). The drones flew evenly spaced transects approximately 500 m apart across the entire survey area (Figure 3). This spacing provided complete visual coverage of the surveyed area.

The drones were able to fly at temperatures ranging from +3°C to -30°C with virtually no noise detectable from the ground, resulting in minimal disturbance to wildlife and livestock in the area. The drones performed well in high winds but were unable to fly on days with a high risk of wing icing.

The combination of optical zoom and infrared imaging capabilities provided superior detection of animals compared to human observers in helicopters, particularly in densely vegetated areas where elk are well camouflaged (Figures 4a,b). Upon detection, all observed animals were counted and classified by sex and age class in real-time (Figures 5 and 6). Subsequently, we reviewed all video footage with wildlife observations to confirm observations, counts and classifications. Lastly, we quantified drone sightability by comparing known locations of collared elk during the survey to the drone footage and determined whether elk were double-counted or missed.

Figure 2. SW-117 RPAS Fixed-wing drone (Superwake Inc.) used to survey Takhini elk, November-December, 2024.

Figure 3. Drone flightlines illustrating 500m transects.

Figure 4a. Still image of drone infrared footage of Takhini elk, November-December, 2024.

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Figure 4b. Still image of colour footage of Takhini elk, November-December, 2024.

Figure 5. Still image of colour footage of a mature bull elk observed during the Takhini elk survey, November-December, 2024.

Figure 6. Still image of colour footage of a group of cow and calf elk observed during the Takhini elk survey, November-December, 2024

Results and discussion

Abundance and composition

We detected 270 elk within the survey area (Figure 7) and confidently classified 244 according to sex and age class: 36 mature bulls, 21 yearling bulls, 132 cows and 55 calves. The remaining 26 elk could not be reliably classified because of grainy imagery; however, we are reasonably confident that these individuals were not mature bulls.

Among classified elk, the bull-to-cow ratio was 27 mature bulls per 100 cows, or 43 bulls per 100 cows when mature and yearling bulls were combined. Most unclassified elk were likely not mature bulls because their large antlers are generally highly visible. Therefore, the true bull-to-cow ratio is lower than these estimates. For small or spatially isolated populations, many jurisdictions recommend maintaining higher bull-to-cow ratios in the range of 40 bulls per 100 cows post-harvest. Therefore, the current mature bull harvest in this population is likely near the maximum level that can be sustained to maintain an appropriate sex ratio.

The observed early-winter calf-to-cow ratio among classified elk was 42 calves per 100 cows. The 26 unclassified elk were likely either cows or calves, and this uncertainty provides a range of possible ratios. If all unclassified elk were calves, the ratio would increase to 52 calves per 100 cows; if all were cows, the ratio would decrease to 35 calves per 100 cows. Thus, the estimated calf-to-cow ratio is 42, with a possible range of 35–52 calves per 100 cows. Generally, we focus more on late-winter calf-to-cow ratios because they are a better indicator of calves recruited into the population (after overwinter mortality).

During the survey, 9 collared elk overlapped spatially and temporally with the drone flight paths. Of these, 8 individuals were detected by the drone, and one was likely missed, yielding an estimated sightability of 89 per cent (11 per cent missed). Based on this detection rate and the timing of the survey, we have high confidence that the observed count of 270 elk closely reflects the true population size of the Takhini herd. Accordingly, we estimate the Takhini elk herd at approximately 270 elk, with an upper bound of 300 animals. Overall, drones with infrared capabilities appear to provide more reliable estimates of total elk abundance whereas manned helicopter surveys were more effective for estimating recruitment and herd composition because observers can circle groups and achieve more accurate classifications.

In addition to elk, the drones detected deer, moose, bison, caribou, lynx, coyote, feral horses and wolves.
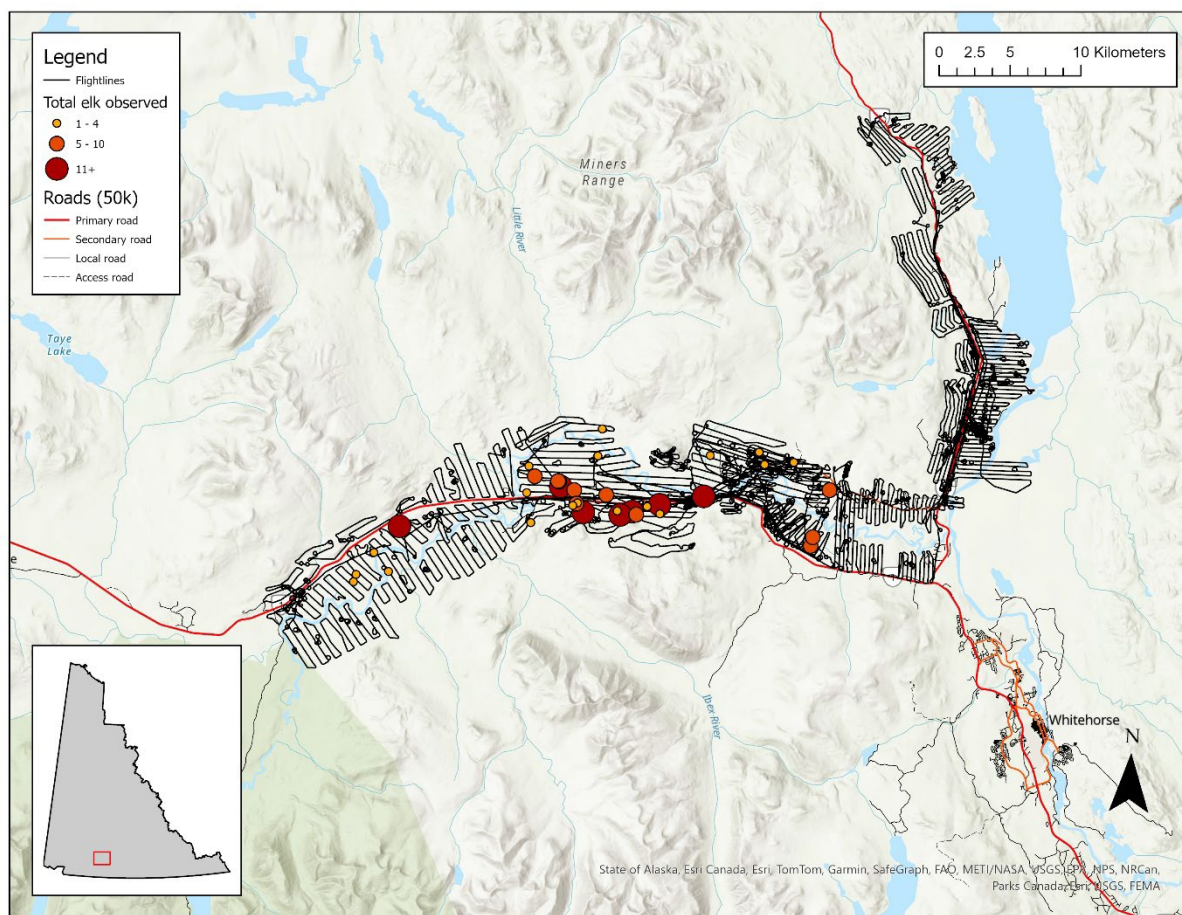
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Figure 7. Drone flight lines and elk observations scaled relative to group size during the Takhini elk survey, November-December, 2024.

Harvest

The first regulated elk harvest for licensed and First Nation hunters in the Yukon occurred in 2009 (Table 2). Elk are not a subsistence species in the Yukon and the three First Nations with Traditional Territories overlapping the Takhini elk range are allocated 20 per cent of the total number of permits issued annually. During the initial two years, both bull and cow permits were issued within the core range of the Takhini herd (Figure 8 and Table 2). Since then, however, harvest has been restricted to the buffer area as a management tool to reduce conflicts with agricultural landowners.

Bull and cow elk in the exclusion area can be hunted at any time of year (Figure 8). Most animals are harvested along the Alaska highway between the western buffer zone and Haines Junction or in the North Klondike Highway agricultural area. We consider these elk to be part of the Takhini herd for harvest management purposes. Since 2009, 12 bulls and 2 cows were harvested in the exclusion zone.

Two types of permits are issued to hunt elk. Permit Hunt Authorizations (PHAs) are allocated through a lottery system and allow successful applicants to harvest an elk throughout the hunting season. Since 2015, the PHA permits are issued for bulls of any

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size. In contrast, *Wildlife Act* (WA) permits provide greater flexibility, as they may be issued outside of the lottery to target specific age or sex classes and to focus harvest in particular areas and time periods when and where agricultural conflicts occur. Mature bulls (defined as having more than five antler points) are typically excluded from these permits. Over the years, various restrictions have been periodically applied to WA permits to either restrict or expand harvest opportunities. The aim of these amendments has been to mitigate agricultural conflicts and, when required, reduce the number of elk while maintaining herd sustainability.

Between 2009 and 2024, a total of 227 Takhini PHA opportunities were issued, resulting in the harvest of 58 bulls and 68 cows. Since 2015, 258 *Wildlife Act* permits were issued resulting in the harvest of 51 bulls and 34 cows. Combined with the harvest from the exclusion area (9 bulls and 2 cows), a total of 222 elk have been hunted from this herd since 2009.

Since the last population survey in 2021, 24 bulls were harvested (average annual harvest of 6 bulls per year) through PHA and WA permits (2021-2024) and the population has remained relatively stable. This bull harvest represents 17 per cent of the 36 mature bulls located by the drone, a high rate for northern ungulate populations even if we assume that some individuals were missed by the drone. The Takhini elk population has a very high degree of variation in late-winter recruitment rates ranging from 9 to 41 calves per 100 cows (2021-2024; Table 1). Continuing regular late winter recruitment monitoring and adaptive harvest management tools are necessary for ensuring the population remains stable under this high level of harvest.

Table 2. Permits and harvest in the Takhini elk herd between 2009 and 2024

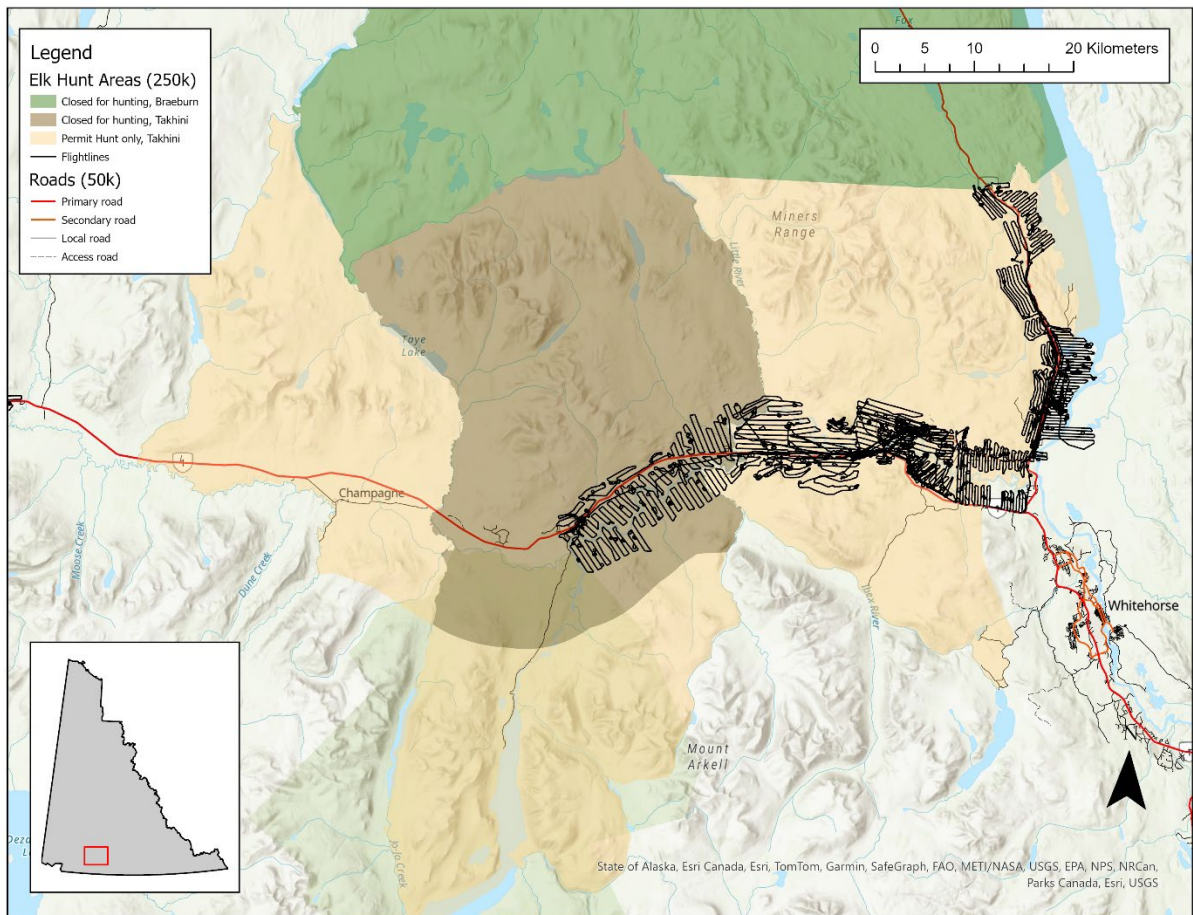| Hunting season	Permits					Harvest						
	PHA permits			Adaptative Wildlife Act permit/ Agricultural Conflict	Total	PHA Takhini buffer and core		Adaptative Wildlife Act permit/ Agricultural Conflict		Total		
	Bull	Cow	Total			Bull	Cow	Bull	Cow	Bull	Cow	All
2009	16	20	36	0	**36**	12	7	0	0	12	7	19
2010	22	43	65	0	**65**	18	15	0	1	18	16	34
2011	0	66	66	0	**66**	0	34	0	0	0	34	34
2012	2	18	20	0	**20**	1	8	0	0	1	8	9
2013	3	2	5	0	**5**	3	2	0	0	3	2	5
2014	3	2	5	0	**5**	3	2	0	0	3	2	5
2015	2	0	2	24	**26**	2	0	6	5	8	5	13
2016	2	0	2	6	**8**	1	0	0	2	1	2	3
2017	2	0	2	2	**4**	1	0	1	0	2	0	2
2018	2	0	2	57	**59**	2	0	6	12	8	12	20
2019	2	0	2	19	**21**	1	0	9	0	10	0	10
2020	4	0	4	70	**74**	4	0	15	14	19	14	33
2021	4	0	4	55	**59**	4	0	6	0	10	0	10
2022	4	0	4	7	**11**	1	0	0	0	1	0	1
2023	4	0	4	9	**13**	3	0	4	0	7	0	7
2024	4	0	4	9	**13**	2	0	4	0	6	0	6
Total	**76**	**151**	**227**	**258**	**485**	**58**	**68**	**51**	**34**	**109**	**102**	**211**

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Figure 8. Takhini elk hunting areas (2025) including the core range (dark brown – closed to hunting) and the buffer zone (light brown – permit area) and surrounding exclusion zone (no colour).

Conclusions and recommendations

- Fixed-wing drones equipped with infrared and colour cameras were effective for estimating total population size with minimal disturbance.

- The current mature bull harvest in this population is likely near the maximum level that can be sustained to maintain an appropriate sex ratio.

- Harvest rates, particularly with the addition of *Wildlife Act* permits to address elk-agricultural conflict, are high for this small and isolated population.

- In addition to high harvest, calf recruitment is variable but generally low. Accordingly, late-winter recruitment should be monitored annually to support adaptive harvest management and maintain the long-term sustainability of the herd.

References

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