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Results of a 2024 Population Survey of Reintroduced Bison (*Bison bison*) in the Yukon

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Government of Yukon
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Executive Summary

- Surveys of the Aishihik bison population are used to track their abundance and annual demographic values such as productivity and sex-ratios, as well as to manage a well-subscribed annual harvest by Yukoners.
- The last population census was conducted in summer 2022 and estimated 1,951 adults (95% confidence intervals = 1,688 – 2,295), amounting to a 47% increase in population size since the previous population census in 2016.
- As a mark-resight population estimate was not possible in 2024 due to shifts in seasonal bison movement, we sought to obtain a minimum count by counting as many bison as possible during the allotted time (2 days), like surveys conducted in 2020, 2021, and 2023. We focused our search effort on known locations of 41 GPS-collared bison and other areas known to be seasonally used.
- We flew approximately 1,650 km (excluding the ferry from Whitehorse), during which we observed 26 groups of bison, totalling 740 animals (632 adults and 108 calves).
- The Minimum Number Known Alive (MNKA) was 632. For comparison, the MNKA in 2020, 2021, and 2023 were 1,054, 786 and 776, respectively.
- In July 2024, calf production (15%) was lower than observed in 2020 (26%), 2021 (21%) and 2023 (17%). The percent of dominant bulls to adult females was lower than 2020 (14%) but the same as in 2021 and 2023 (7%).
- Reasons for the lower number of bison seen in 2024 compared to previous surveys are likely in part due to random chance in encountering bison, which is a hazard of MNKA surveys. Some known GPS-collared bison were missed in the survey as the bison remained in treed habitat where they could not be seen or counted. Other groups of bison not associated with collared animals were also likely not detected or counted.
- The reduction in bison seen in 2024 may reflect a real decrease in the population. However, given the limitations of MNKA surveys and the results of a mark-resight population survey in 2022 using more reliable methods, this is unlikely. Given the 2022 mark-resight population census provided clear evidence that the population has been growing, it is most likely that the population remains well above a minimum threshold of 1,000 animals (not including calves).
- A new mark-resight at the next available opportunity will indicate the current size of the Aishihik population.

Contents

Introduction

Bison (*Bison bison*) were reintroduced into the Aishihik area from 1988 to 1992 as part of a national recovery effort to restore the species to its native range (Government of Yukon 2012, Environment and Climate Change Canada 2018). The population has grown consistently and was last estimated in the summer of 2022 at 1,951 adults (95% confidence intervals = 1,688 – 2,295), representing a 47% increase in population size since the previous estimate in summer 2016 (Jung et al. 2023a). Population surveys are fundamental for the Aishihik population and are used to track the restoration effort as well as to support an annual harvest, popular with many Yukoners. Since 2007, bison management has relied on the mark-resight methodology, using paintballs to mark animals, when estimating the size of the population (Hegel et al. 2012, Jung and Egli 2011, 2014, Jung et al. 2023a). Bison harvest in the Yukon is managed under an adaptive management framework, and repeated population estimates allow bison managers (i.e., the Aishihik Bison Technical Team) to track population trends and evaluate the effectiveness of changes in the harvest regime.

Mark-resight population estimates for the Aishihik population were conducted using consistent methodology in 2007, 2009, 2011, 2014, 2016 and 2022. A detailed account of the methodology used to conduct a mark-resight population estimate of bison can be found elsewhere (see Hegel et al. 2012, Jung et al. 2023a). However, mark-resight population estimates for the Aishihik population were not possible from 2019 to 2021 due to a lack of helicopter availability and a shift in seasonal bison movements. During this period, bison did not move into the alpine making it difficult to count them. THe reasons for this change in behaviour are unknown, but it may be due to several factors such as seasonal weather patterns, insect harassment or predation pressure in alpine areas by grizzly bears (Jung et al. 2024). Our mark-resight methodology relies on bison congregating in open alpine habitat, where the number of marked (paintballed) animals can be precisely counted (Hegel et al. 2012, Jung et al. 2023a). With many bison not migrating to the alpine and instead

remaining in treed habitats at low elevations, mark-resight methods are challenging and are unlikely to produce reliable population estimates.

While the intention was to conduct a mark-resight population estimate for the Aishihik population in 2024, GPS-collar locations indicated that much of the herd was not moving into the alpine towards mid-summer, as expected. Since a mark-resight approach would not be feasible or reliable, we conducted a minimum count of the herd (also known as the Minimum Number Known Alive [MNKA]), similar to surveys conducted in 2020, 2021 and 2023 (Jung et al. 2020, Jung et al. 2023b, Miller et al. 2023). A minimum count survey aims to count all the animals we can find to get a minimum number of animals in the population. In contrast, a population estimate, as was performed in 2022, involves repeated daily counts of marked and unmarked animals and then uses statistical modelling to estimate the population size—the number seen during the survey plus an estimate of those missed. Minimum count surveys provide a cost-effective method for monitoring the status of the Aishihik bison population when mark-resight population estimates are not feasible or necessary. These surveys allow bison managers to track the population size and demographic parameters and can serve as an early warning if changes in the harvest regime are required.

Methods

On 26 and 27 July 2024, we used a helicopter to locate and complete a composition count of bison, and obtain a Minimum Number Known Alive (MNKA). The crew consisted of a navigator, two observers, and the pilot. As with previous MNKA surveys, our strategy was to locate bison associated with 41 GPS-collared animals based on their recent locations (within 24 hours), as well as by searching adjacent and other areas known to be seasonally used during the summer. We also prioritized flying over the east side of Kluane Lake, at the request of Kluane First Nation and Dän Keyi Renewable Resource Council (**Figure 1**). Our strategy aimed to count as many bison as possible during the allotted two-day period, while distributing our effort across the population's range.

When we encountered a group of bison, the navigator counted and determined the group composition of all adults (≥1-year-old), while the observer seated behind counted the calves. We obtained the coordinates of each encountered group using a GPS. From the field data, we determined the MNKA using adults only, as was done in previous MNKA and mark-resight surveys. We also calculated the percentage of calves and dominant bulls in the population, as well as the mean (average) group size.

Results and Discussion

We flew approximately 1,650 km during the survey (excluding the ferry from Whitehorse) and used 10.6 hours of helicopter time (**Table 1**). Our survey effort was like the MNKA survey in 2023, but was expandedfrom surveys in 2020 and 2021 to provide more complete coverage of the population's range. Additionally, we were able to pick up GPS collars from both bison and caribou (*Rangifer tarandus*) that had died in recent months, as well as collect fecal samples. Survey conditions were reasonable to favourable, with periodic cloud cover and light rain; however, we were not prevented from flying anywhere due to weather.

We observed 26 groups of bison, totalling 632 adults and 108 calves (**Table 1, Appendix 1**). For management purposes, the total MNKA is 632. While this number is lower than the the bison counts from Aishihik in 2020, 2021 and 2023, which were conducted using similar methods (Jung et al. 2020, Jung et al. 2023a, Miller et al. 2023), we are confident that this figure is an underrepresents the true population size. THis is due to our inability to observe several GPS-collared bison that were located in densely forested habitat, particularly to the east of Aishihik Lake.

Group size ranged from 1 to 140 bison (including calves). As in previous years, large aggregations were observed in the Kloo Lake area and north of Big Mountain. THe mean group size for mixed groups was 35.6 ± 30.3 (n = 20; range = 7 to 140), and for bull-only groups it was 1.0 ± 0.0 (n = 6; range = 1). Group size is greatest at this time of year because mixed groups coalesce, and dominant bulls join them in large post-calving aggregations before the onsetof the rut (Jung 2020).Neverthelees,, the average size of mixed groups

remained greater than typically observed, From July 1999 to 2014 the average group size was 21.7 bison per group (32.8 bison per group in 2021; Jung 2020, Jung et al. 2023a).

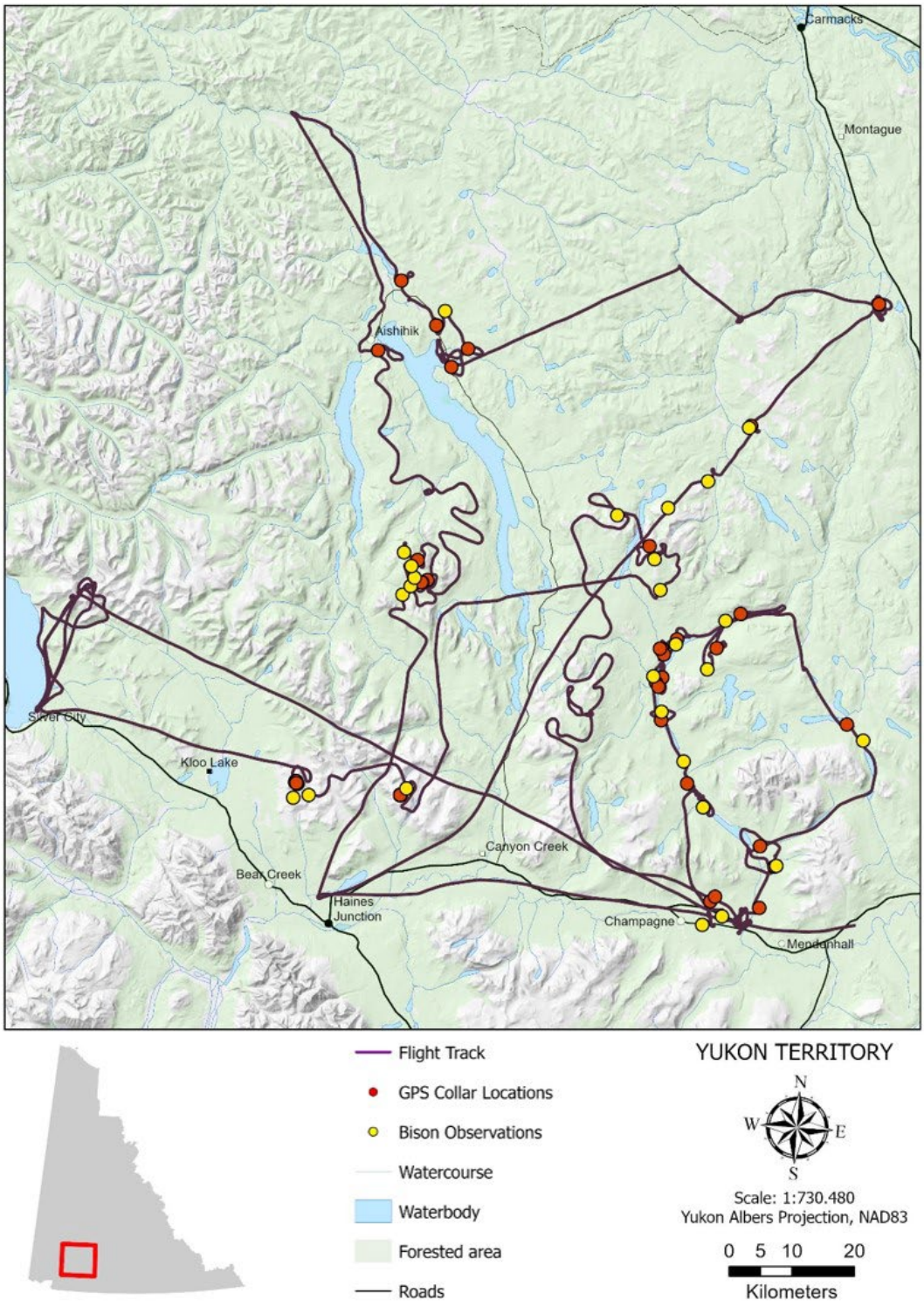

Fig. 1. Flight track and bison observations during an aerial survey conducted on 26 and 27 July 2024.

Table 1. Summary of results from three aerial surveys for bison in southwestern Yukon, summer 2020, 2021, 2023 and 2024.

Survey Results	2020 Results	2021 Results	2023 Results	2024 Results
Survey date	17 July	13 July	28-29 June	26-27 July
Survey effort	8.2 hrs 1,046 km	8.1 hrs 1,094 km	13.2 hrs -- km	10.6 hrs 1,650 km
Number of GPS-collared bison	29	22	60	41
Total number of bison observed	1,325	954	907	740
Number of adult bison observed	1054	786	776	632
Number of calves observed	271	168	131	108
Percent calves in the population	26.0%	21.4%	16.9%	15.0%
Percent of dominant bulls observed	14%	7%	~7%	~7%
Number of groups observed	55	39	47	26
Group size range	1–108	1–88	1–78	1–140

Calf composition, a measure of productivity, was 15.0 calves per 100 adults. This value is lower than previous surveys in 2014, 2016, 2020, 2021 (all above 20 calves per 100 adults) and 2023 (16.9 calves per 100 adults). Reasons for the decline are unknown but may be a result of deep winter snows impacting the condition of newborn calves or their mothers, thus impacting calf survival . However, many factors influence calf survival, and this measure of productivity does not directly translate to the number of calves recruited into the population by the end of the next winter. The number of calves recruited into the population is likely to vary from year to year, depending on factors such as predation, snow depth, winter severity or other factors.

The percentage of mature, dominant bulls (≥8 years old) relative to adult females was aproximately7%, which is similar to 2021 and 2023, but half of the 14%seen in 2020 (14%; **Table 1**; Jung et al. 2020, Jung et al. 2023b, Miller et al. 2023). This percentage underestimates thebulls to females, as yearlings and young bulls still with their maternal groups could not be sexed, so both sexes are included in the cow-calf groups. Additionally,

some observations occurred when groups moved into forested or covered habitats where composition could not be determined. Another approximately 25% of the animals observed were younger bulls (estimated at 2 to 7 years old). Many of those will survive to become dominant bulls. This value is higher compared to the survey conducted in 2021 (6% young bulls; Jung et al. 2023b) and 2023 (~22% young bulls; Miller et al. 2023). While the decrease in the number of dominant bulls observed since 2020 is concerning and should continue to be closely monitored, the number of dominant bulls required to maintain a bison population is low, as only a few dominant bulls are successful in breeding.

Bison were widely distributed across their range, with many observed in the alpine areas above Kloo Lake, Ittlemit Lake, and Long Lake, as well as at lower elevations near Hutshi and Taye lakes, and Aishihik Village (**Figure 1**). Similar to the survey conducted in 2021, we observed bison in the Aishihik Village and Hutshi Lakes areas remained at lower elevations rather than moving into the alpine. The reasons for these distribution anomolies are unknown; however, the implication is that an unknown portion of the population was in the trees at low elevations, which made it challenging to locate and count individuals.

Incidental observations of other wildlife were also made, including caribou, thinhorn sheep (*Ovis dalli*) and grizzly bears (*Ursus arctos*).

Conclusions

Our aerial survey indicated that the size of the Aishihik bison population in July 2024 was at least 632 animals, excluding calves. This is a slightly lower MNKA value to 2021 and 2023, but substantially lower than in 2020 (**Table 1**). Moreover, calf production observed was lower than in similar surveys from previous years. The ratio of dominant bulls to adult females and yearlings was consistent with surveys in 2021 and 2023, but lower than previous years.

The reasons for the reduced numbers in our MNKA count are unknown, but likely result from simply seeing more animals in previous years. The fundamental problem with a minimum count, as performed in this work, is that it does not indicate the true population

size, unlike a mark-resight survey or other similar types of surveys. Although the intention was to conduct a mark-resight survey this year to obtain a more accurate population estimate, shifts in seasonal bison distribution- similar to those observed in recent years- prevented the implementation of such a survey.

The use of 41 GPS collars aided us in identifying group locations, and without these known locations of collared animals our MNKA would almost certainly be lower. We had significantly more active GPS collars than in past years (2021 = 22, 2020 = 29), but fewer active GPS collars than in 2023 (n = 58). Despite this, we observed fewer groups than in previous years (**Table 1**), even given the increased survey effort.

The reduction in bison seen in 2024 may reflect a real decrease in the population. However, given the limitations of the MNKA approach and the population estimate conducted in 2022 using more reliable methods, this is unlikely. The reduction in observed bison is more likely due to behavioural changes in which bison are remaining in low elevation forest habitat rather than moving into alpine habitat in June and July. This shift in seasonal distribution creates a challenge for monitoring the population through mark-recapture methods, as well as MNKA approaches, and may result in inaccurate or underestimated population sizes.

While the aerial surveys conducted in 2021 and 2023 counted lower numbers than in 2020, a more accurate mark-resight survey conducted in 2022 indicated that the bison population has increased since 2016 (Jung et al. 2023a). Given the 2022 mark-resight population census provided clear evidence that the population has been growing, it is most likely that the population remains well above a minimum threshold of 1,000 animals (not including calves). A new mark-resight population survey will help clarify the current status of the Aishihik population.

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Appendix

Appendix 1. Raw count data from an aerial survey of bison on 26–27 July 2024.

Obs.	No. calves	No. adults & yearlings	No. females & yearling males	No. young males	No. dominant males	Group type	Group size
1	0	1	0	0	1	Bull	1
2	0	1	0	0	1	Bull	1
3	9	64	34	22	8	Mixed	73
4	0	1	0	0	1	Bull	1
5	8	19	13	4	2	Mixed	27
6	5	54	-	-	-	Mixed	59
7	3	38	16	18	4	Mixed	41
8	1	9	-	-	-	Mixed	10
9	0	1	0	0	1	Bull	1
10	1	18	-	-	-	Mixed	19
11	5	27	17	8	2	Mixed	32
12	-	27	-	-	-	Mixed	27
13	1	11	7	4	0	Mixed	12
14	0	1	0	0	1	Bull	1
15	3	33	17	14	2	Mixed	36
16	6	32	20	11	1	Mixed	38
17	1	14	6	7	1	Mixed	15
18	2	5	5	0	0	Mixed	7
19	4	14	-	-	-	Mixed	18
20	3	16	-	-	-	Mixed	19
21	0	1	0	0	1	Bull	1
22	4	36	21	11	4	Mixed	40
23	1	10	7	2	1	Mixed	11
24	10	43	29	13	1	Mixed	53
25	31	109	70	28	11	Mixed	140
26	10	47	28	15	4	Mixed	57
TOTALS	**108**	**632**	**290+**	**157+**	**47+**		**740**