

# **An Assessment of Likely Consequences of Various Harvest Levels for the Bluenose-East Caribou Herd 2023-2026**

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## **Background:**

A June 2023 calving photo survey of the Bluenose-East caribou herd resulted in an adult female estimate of 24,466 and a herd size estimate of 39,525, both substantial increases over the 2021 and 2018 estimates (Boulanger et al. 2024). Previously the herd had shown a large decline 2010-2018 and then appeared to stabilize 2018-2021. From 2018-2023, demographic indicators such as calf:cow and bull:cow ratios have been consistent with a positive herd trend. Observations in recent years from the Kugluktuk Hunter and Trappers Organization (KHTO) and the Tłı̄chǫ Ekwò Nàxoèdee K'è ground-based caribou observation program indicate that Bluenose-East caribou have been in very good condition, summer feeding conditions have been good, and that calves, yearlings and young cows and bulls are abundant.

There have been restrictions on total allowable harvest of the Bluenose-East herd in Nunavut under the Nunavut Wildlife Management Board and the KHTO plan (currently 170 with an up to 1:1 female to male harvest sex ratio), in the Sahtú Settlement Area under the Délı̄nǫ Belare Wı̄le Gots'e' ʔekwe' plan (currently 30 bulls), and in Wek'èezhii under the Wek'èezhii Renewable Resources Board (currently 193 bulls for all user groups). These restrictions were put in place between 2019 and 2021 after the large decline of this herd between 2010 and 2018. Given the herd's change to a stable trend 2018-2021 and an increasing trend 2021-2023, some hunters have expressed interest in considering an increase in total allowable harvest.

This document summarizes main outcomes of a harvest modeling exercise carried out to assess likely consequences of a range of harvest levels and harvest sex ratios for the Bluenose-East herd on a short-term basis, 2023-2026. The model projections are not predictions, but rather are suggestions of likely trend under a defined set of conditions. Previously, likely effects of harvest on a barren-ground caribou herd under a wide range of conditions were described by Boulanger and Adamczewski (2016); the current assessment was specific to the Bluenose-East herd in 2023.

A full report on the harvest modeling results by J. Boulanger (2024) can be made available on request. In this brief overview document, we highlight main trends in the modeling results. We hope these results will assist the Nunavut Wildlife Management Board in considering how various levels of harvest might affect the herd.

## **Basic model values used**

The model caribou herd was assumed to start at 39,525 adults (the 2023 Bluenose-East estimate), including 24,466 cows and 15,059 bulls. Possible future trends of a stable herd (population growth rate or  $\lambda$  of 1.00), a moderately increasing trend ( $\lambda$  of 1.05 or 5% increase/year) and a more rapidly increasing trend ( $\lambda$  of 1.11 or 11% increase/year) were used. A declining trend was also used in the model runs, but is omitted here for simplicity. Calf productivity and survival rates of cows, calves, yearlings and bulls were set to fit each population trend and then remained at those values through the simulations. The modeled interval was 3 years, to match a commonly used survey interval. Experience has also shown that this herd's

dynamics can change quickly, which is another reason this modeling was restricted to a short 3-year time interval. In particular, recent monitoring indicates that summer feeding conditions and the severity of the insect season are important for Bluenose-East caribou growth, condition and pregnancy rate, and weather can vary widely from year to year. Harvest levels of 0, 400, 600, 800, 1200, and 1600 caribou were used, which represent 0%, 1.0%, 1.5%, 2.0%, 3.0%, and 4.0% of the 2023 herd size. Harvest sex ratio was varied between 0, 20, 50, 80 and 100% bulls.

### **Effect of a variable harvest rate on herd trend**

In Figure 1, projected herd trend 2023-2026 is shown as a series of graphs corresponding to 0, 1, 1.5, 2, 3 and 4% harvest levels. Harvest sex ratio was kept at 50% bulls in all cases. In each case, underlying herd trends (with no harvest) of stable, increasing moderately at 5%/year and increasing rapidly at 11%/year were used. Projected herd size in 2026 is shown; values were rounded to the nearest hundred caribou.

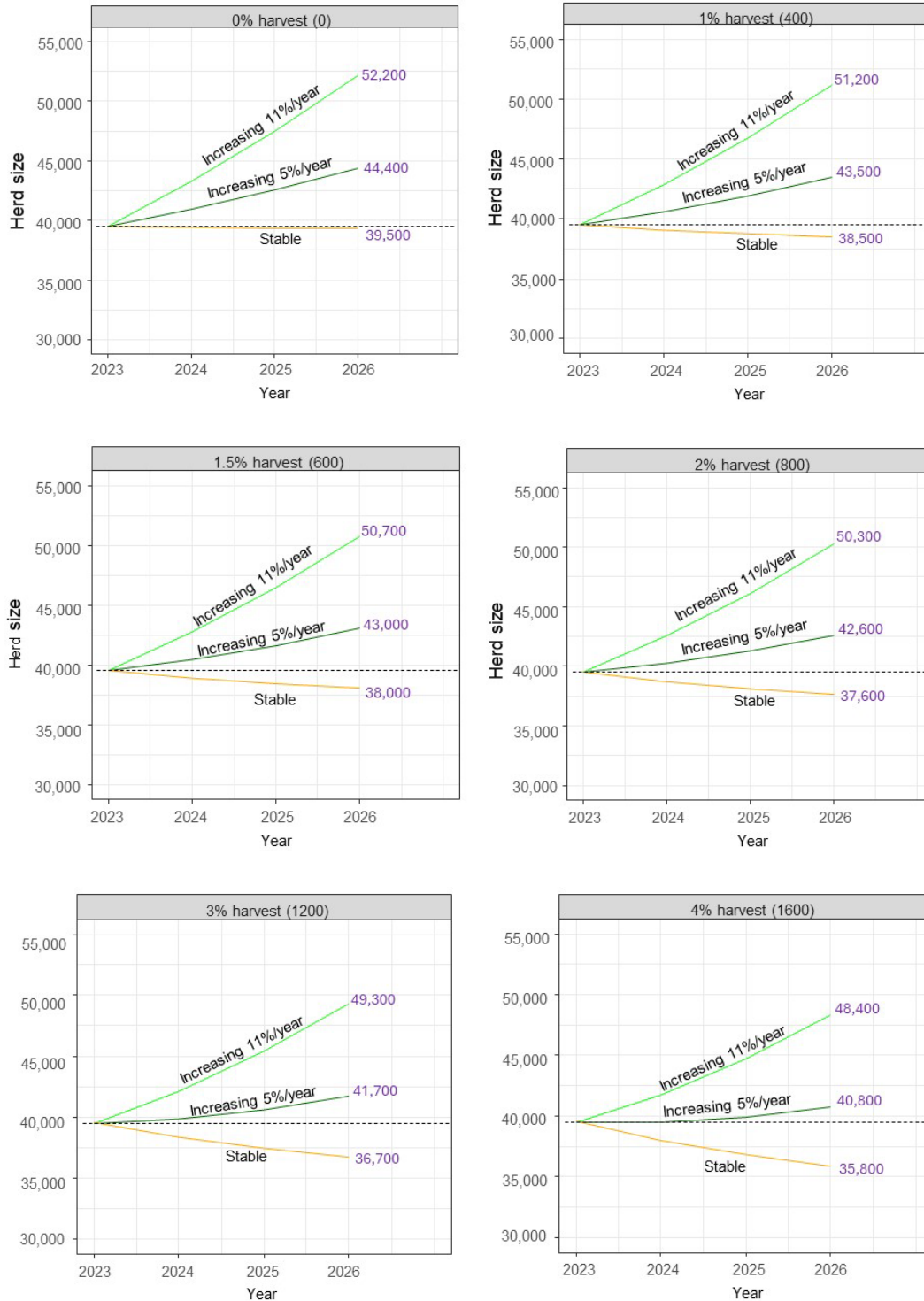
With no harvest, the herd increasing at 11%/year would increase to 52,200 by 2026, the herd increasing at 5%/year would increase to 44,400 by 2026 and the stable herd would remain at the starting level of 39,525.

In the herd increasing at 11%/year, harvest of all levels between 1% and 4% of the herd would result in an increasing herd by 2026. At the highest harvest level of 4%, the herd would be at 48,400 in 2026 compared to 52,200 with no harvest. In this case, the underlying balance between births and deaths is strongly positive, thus the harvest levels simulated would slow the population's growth rate somewhat, but the herd would continue to increase.

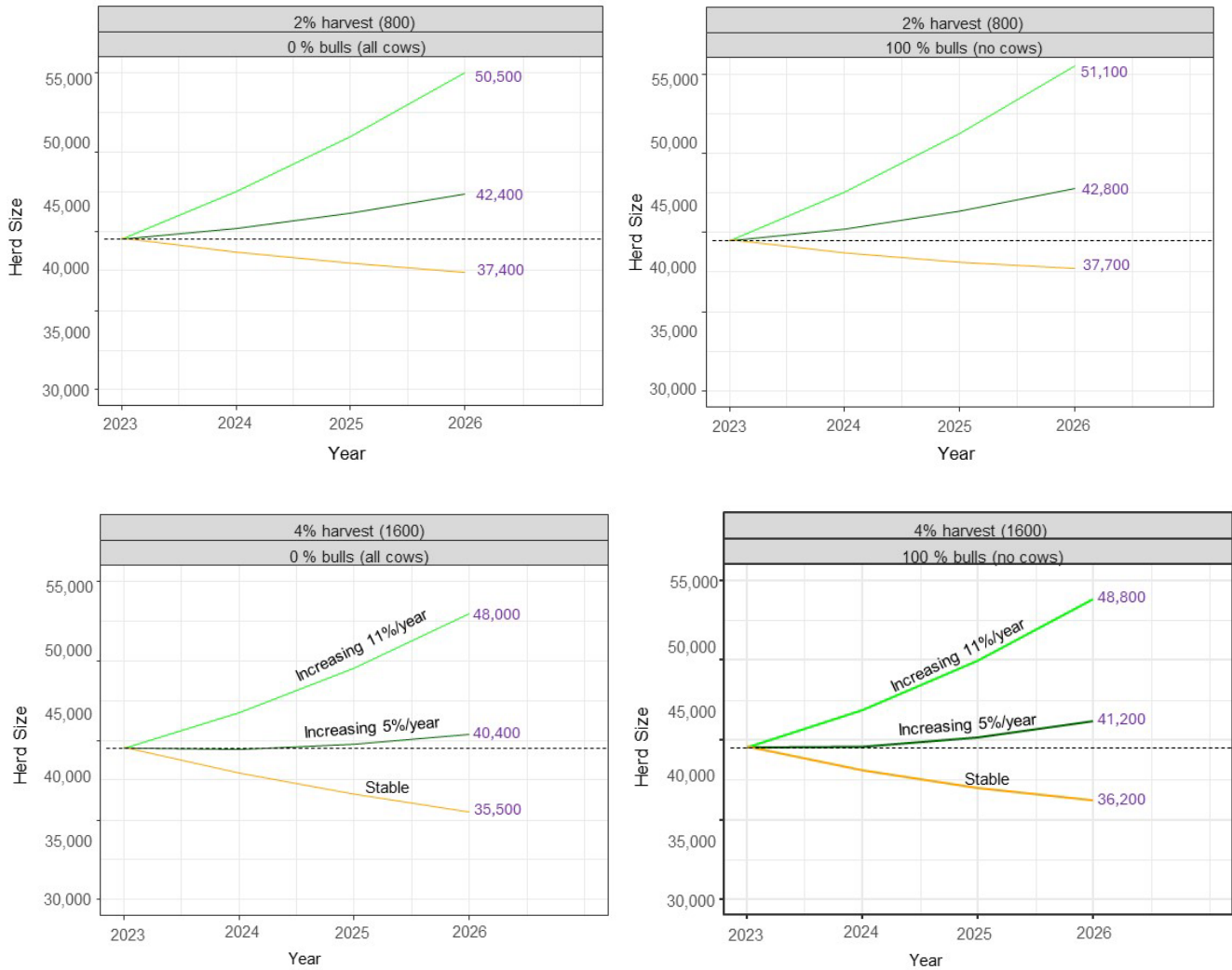
In the herd increasing at 5%/year, the herd would again continue to increase with all levels of harvest considered. However at a 4% harvest level, the growth rate of the herd would be relatively slow and the herd would be at 40,800 in 2026 compared to 44,400 with no harvest. In this situation the underlying balance between births and deaths is positive, though not as much as in the herd increasing at 11%/year.

In the herd with an underlying stable trend, all levels of harvest would result in a declining trend, although the rate of decline would be relatively low under most harvest conditions. The effect of lower levels of harvest would be limited, but with a 4% harvest the herd would be projected at 35,800 in 2026 compared to the herd remaining approximately at the starting size of 39,525 with no harvest. In this case the underlying balance with no harvest is equal between deaths and births, thus any additional deaths from harvest will result in a declining trend.

To assess potential effects of variation in harvest sex ratio on likely herd trend, four examples are provided in Figure 2: 2% harvest of 100% bulls, 2% harvest of 0% bulls (all cows), 4% harvest of 100% bulls and 4% harvest of 0% bulls (all cows). Results were similar for the four cases considered. Herd size projected for 2026 based on an underlying trend of 5% annual increase is projected to be 40,400 with a 4% all-cow harvest compared to 41,200 with a 4% all-bull harvest. The relatively similar results for all-cow and all-bull harvests reflect a number of factors: the projection period is short (3 years) and a difference between all-bull and all-cow harvests would accumulate over a longer time period; the harvest rates simulated are generally low; and the herd has had a healthy bull:cow ratio and good calf recruitment. A large cow harvest in a declining herd would be expected to have a stronger effect on herd trend, particularly if it continues for many years.



**Figure 1.** Harvest modeling projections of Bluenose-East herd size in 2026 with 3 underlying population trends and harvest levels of 0, 1, 1.5, 2, 3 and 4% of the 2023 herd estimate. Sex ratio of the harvest was 50% bulls. Starting herd size was 39,525 in all cases. Projected herd size in 2026 is shown in purple, rounded to nearest 100.



**Figure 2.** Harvest modeling projections of Bluenose-East herd size in 2026 with 3 underlying population trends, harvest levels of 2% (top) and 4% (bottom) of the 2023 herd estimate. Sex ratio of the harvest was 0% bulls (all cows) on the left and 100% bulls (no cows) on the right. Starting herd size was 39,525 in all cases. Projected herd size in 2026 is shown in purple, rounded to nearest 100.

## References

- Boulanger, J. 2024. Harvest simulations for the Bluenose-East herd 2023. Unpublished contract report for ECC Wildlife Division, Government of Northwest Territories, Yellowknife, Northwest Territories, Canada.
- Boulanger, J., and J. Adamczewski. 2016. A general approach to harvest modeling for caribou herds in the NWT and recommendations on harvest based on herd risk status. Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, Northwest Territories, Canada. Manuscript Report 262.
- Boulanger, J., J. Adamczewski, J. Williams, S. Goodman, and K. Clark. 2024. June 2023 calving ground surveys: Bluenose-East and Bathurst barren-ground caribou herds. Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, Northwest Territories, Canada. Manuscript Report (in prep.).