

Appendix C

Summary of the Likely Consequences of Various Harvest Levels for the Sahtì Ekwò (Bluenose-East Barren-Ground Caribou Herd) 2025–2030

We carried out a set of harvest simulations for the Sahtì Ekwò (Bluenose-East barren-ground caribou herd) for 2025-2030 to provide information to support discussions about harvest levels of the herd.

Methods

These harvest simulations use a deterministic model that is a simplification of actual population dynamics. The model projections are not predictions, but rather are suggestions of likely trend under a defined set of conditions. Therefore, the results should be interpreted in relative terms rather than absolute estimates. The harvest simulations assess likely consequences of a range of harvest levels and harvest sex ratios for the Sahtì Ekwò (Bluenose-East barren-ground caribou herd) on a short-term basis. The harvest simulations follow methods described in more detail in Boulanger and Adamczewski (2016) and Appendix 5 in Boulanger et al. (2024).

In the simulations, the model caribou herd was assumed to start at 28,759 adults (2025 population estimate) including 19,312 cows and 9,447 bulls. We looked at the impact of various harvest levels on a herd that was (a) moderately increasing (λ of 1.05 or 5% increase/year), as predicted in the current integrated population model, (b) stable (population growth rate or λ of 1.00), or (c) a moderate decline of 5%/year (λ of 0.95). The demographic parameters (i.e. survival and productivity) used to create scenarios were based on the Integrated Population Analysis (Appendix A). The calf productivity and survival rates of cows, calves, yearlings, and bulls were set to fit each population trend and remained at those values throughout the 5-year simulation. Harvest levels of 0, 288, 431, 575, 863, and 1,150 caribou were used, which represent 0%, 1.0%, 1.5%, 2.0%, 3.0%, and 4.0% of the 2025 herd population size. The harvest sex ratio varied between 0, 20, 50, 80 and 100% bulls. Values for harvest numbers were rounded to the nearest 10 caribou, and for herd size were rounded to the nearest 100 caribou.

The proposed Total Allowable Harvest (TAH) of 395 caribou corresponds to 1.4% of the 2025 population estimate, and combined with the Nunavut TAH of 450 caribou, the TAH of 845 Sahtì Ekwò (Bluenose-East barren-ground caribou herd) corresponds to 2.9% of the 2025 population estimate. We therefore focused on the potential effects of a harvest of 3% of the 2025 herd estimate, which represents the full use of the Government of the Northwest Territories' (GNWT) and Government of Nunavut's (GN) TAH.

We looked at impacts over 5 years (2025–2030), although the next Sahtì Ekwò (Bluenose-East barren-ground caribou herd) estimate is planned for 2028 with the ability to adapt management actions based on the updated information in 2028.

Results

Effect of Harvest on Predicted Herd Size

The moderate rate of increase of 5%/year was based on a steady rate of increase in herd abundance between population surveys in 2021 and 2025 and was consistent with the predicted herd trend in the integrated population model (Appendix A).

If the herd was increasing at 5%/year, it would continue to increase with all levels of harvest considered. With a 3% harvest rate, after 5 years the herd would increase from 28,759 caribou (2025 population estimate) to between 34,800 caribou (if 100% cow harvest) to 36,500 caribou (if 100% bull harvest) [Figure 1-C].

In a more conservative scenario, in the herd remains stable, after 5 years, a 3% harvest would result in a predicted herd size of 25,700 caribou (if 100% cow harvest) to 27,100 caribou (if 100% bull harvest) [Figure 1-C], compared to the herd remaining approximately at the starting size of 29,400 with no harvest. If the herd had an underlying stable trend, the underlying balance with no harvest is equal between births and deaths, thus any additional deaths from harvest will result in a declining trend, although the effect of lower levels of harvest would be limited.

In the most conservative scenario of a herd decreasing at 5%/year and a 3% harvest rate, after 5 years, the predicted herd size would be between 18,100 caribou (if 100% cow harvest) to 19,300 caribou (if 100% bull harvest), compared to a predicted herd size of 21,500 caribou with this trend after 5 years if no harvest occurred.

The underlying herd trend will continue to be the dominant trend, given the harvest levels considered, and will be modified slightly by harvesting (Figure 1-C).

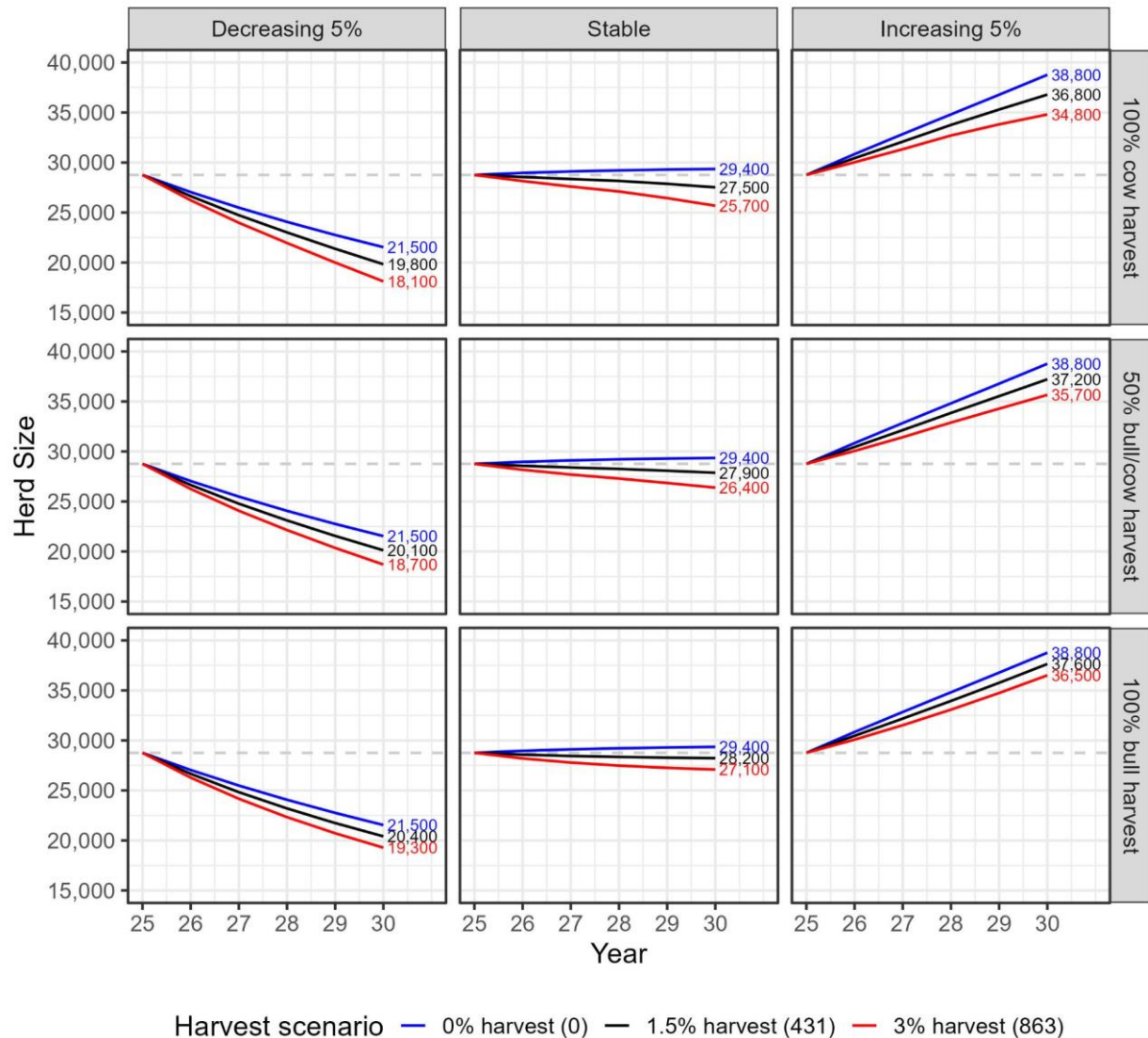


Figure 1-C. Projected herd trajectories for the Sahtì Ekwò (Bluenose-East barren-ground caribou herd) from 2025 to 2030 if the underlying herd trend is decreasing at 5%/year (left column), stable (middle column), or increasing at 5%/year (right column), and an annual harvest of 0% (0 caribou, blue line), 1.5% (431 caribou, black line) or 3% (863 caribou, red line) of the total herd size is applied if that harvest is 100% cows (top row), 50% cows (middle row) or 100% bulls (bottom row). Harvest is expressed both as the percentage of the 2025 herd estimate (28,579: dashed line) and number of caribou harvested.

Model results of all harvest levels and sex ratios are shown in Figure 2-C. This figure illustrates that in the model of the herd increasing at 5%/year, the herd would continue to increase at all levels and sex ratios of harvest considered (up to 4% of the herd estimate). In these models, harvest is added to natural deaths; there is no consideration that a harvested caribou may otherwise have died of natural causes.

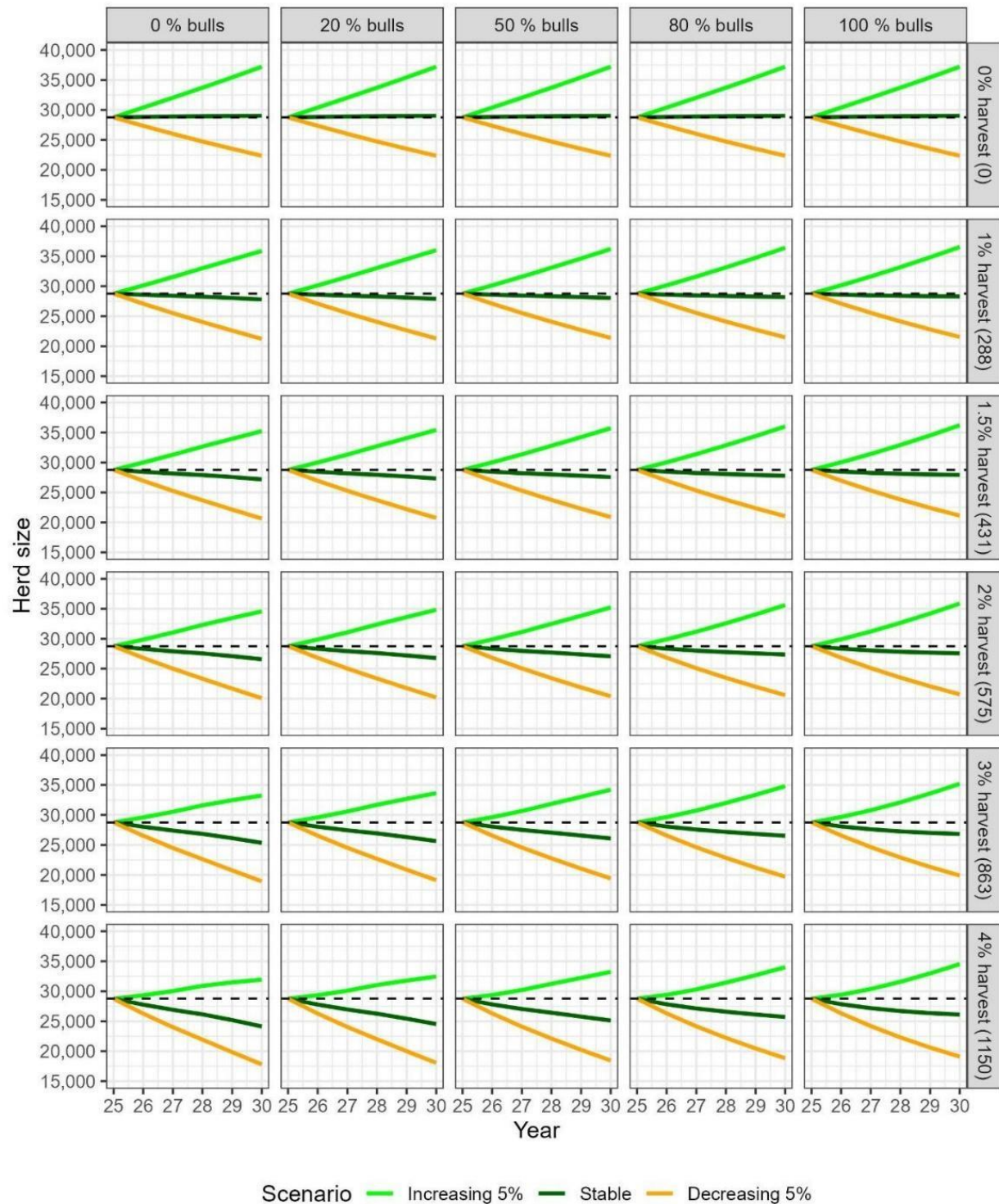


Figure 2-C. Projected herd trajectories for the Sahtì Ekwò (Bluenose-East barren-ground caribou herd) 2025-2030 across a range of harvest and demographic scenarios (increasing by 5%/year, stable, decreasing by 5%/year). Harvest levels of 0, 288, 431, 575, 863, and 1,150 caribou were used, which represent 0%, 1.0%, 1.5%, 2.0%, 3.0%, and 4.0% of the 2025 herd size. The harvest sex ratio varied between 0, 20, 50, 80 and 100% bulls. Harvest is expressed both as the percentage of the 2025 herd estimate (28,579: dashed line) and number of caribou harvested.

When the underlying model herd is stable or decreasing with no harvest, although most deaths will be due to natural causes, any additional deaths from harvest will result in a declining or further declining trend. The trajectories from different harvest levels should be compared to the trajectories with 0 harvest shown in the first column.

Effect of Harvest on Predicted Number of Cows

Barren-ground caribou calving ground surveys are designed to estimate the number of adult females gathered on the calving ground, with the total herd size extrapolated from sex ratio surveys conducted during the fall. Because the number of adult females is the most direct estimate, we modelled the effect of cow harvest on the estimate of the adult females in the herd. We considered the highest level of harvest allowed under the combined NWT and Nunavut TAHs (~3% of the total herd size of 28,759 adult caribou with 100% cow harvest; a harvest of 863 cows (3%) was used in the model though the true TAH of 845 is ~2.9% of total herd size), and looked at the impact on adult female numbers considering a herd that was increasing at 5%/year, stable, or decreasing at 5%/year; the same scenarios as for the total herd (Figure 3-C). For the herd increasing at 5%/year and 3% of total herd harvested with a cow-only harvest, the number of adult females would increase from 19,300 in 2025 to 21,000 adult females in 2030. For the stable trend, harvesting 3% of total herd harvested with a cow-only harvest would result in a predicted 15,900 adult females after 5 years. For the decreasing at 5%/year trend, harvesting 3% of total herd harvested with a cow-only harvest would result in a predicted 11,700 adult females after 5 years.

If the harvest level was 3% of the total herd size and sex ratio of the harvest was 1:1 (50% cows, or 431 cows harvested annually), after 5 years, the number of adult females would increase from the starting value of 19,300 cows to 23,600 cows under the increasing (5%/year) herd scenario, would decrease slightly to 18,500 cows under the stable trend scenario, and would decrease to 14,200 adult females under the decreasing trend (-5%/year) scenario.

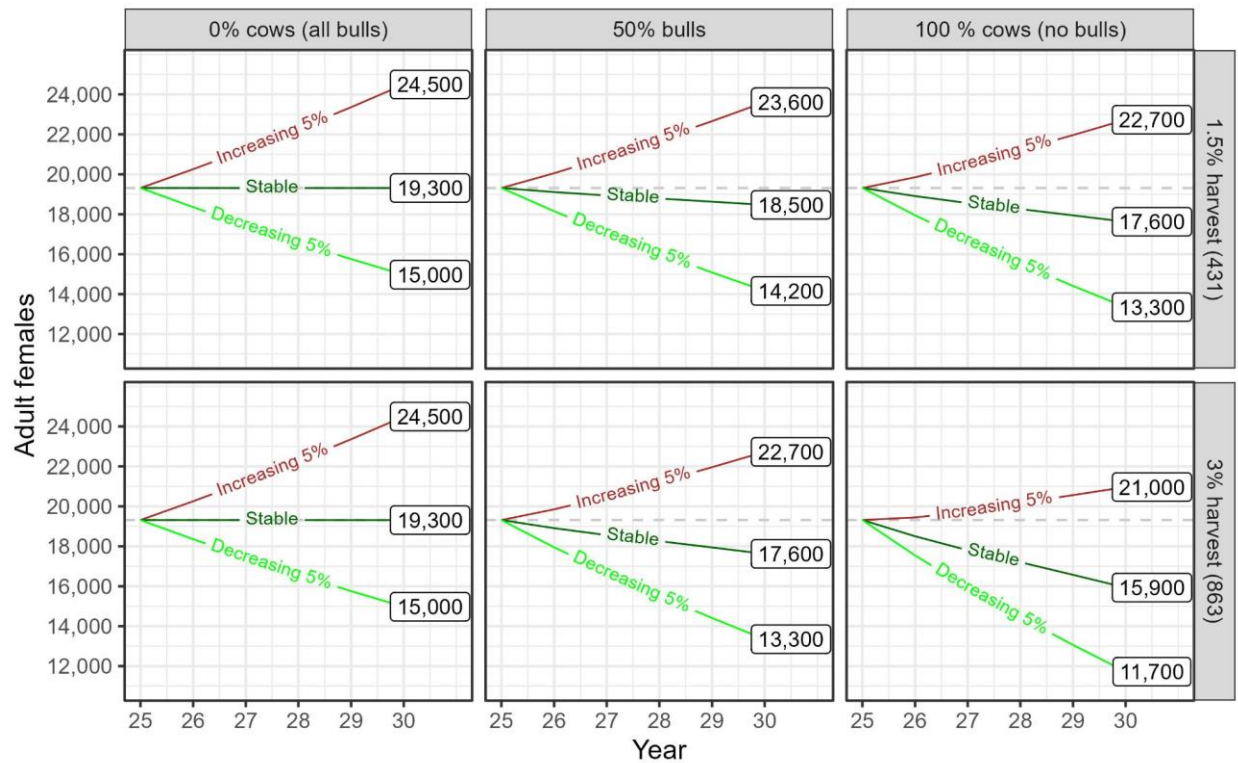


Figure 3-C. Harvest modeling projections of the number of adult females of Sahtì Ekwò (Bluenose-East barren-ground caribou herd) in 2030 with three underlying herd trends (increasing at 5%/year, stable, and decreasing at 5%/year) and harvest levels of 1.5, and 3% of the 2025 herd estimate. Sex ratios of the harvest of 0% bulls, 50% bulls and 100% bulls were used. The starting number of adult females was 19,312 in all cases. The projected number of adult females in 2030 is shown rounded to nearest 100.

Effect of Harvest on Sex Ratio of the Herd

Because the 2025 Sahtì Ekwò (Bluenose-East barren-ground caribou herd) population estimate of 28,759 adults has fewer bulls (9,447) than cows (19,312) in the herd, harvesting an equal number of bulls or cows as a percent of the total herd size will affect bulls more than cows. A TAH of 863 caribou (~3% of the total herd size; the true TAH of 845 caribou is ~2.9% of the total herd) is 9% of the bulls versus 4% of the adult females.

With any harvest, if the harvest level remains constant and the herd is declining, the proportion of the total herd that is harvested will increase. The impact of harvest at lower harvest levels, or on a larger herd, is minimal, because the harvest accounts for only a small proportion of the herd and mortality rates are predominantly natural. When there are fewer males in a declining herd, at higher (>3% of herd) levels of bull harvest, an increasing proportion of the smaller number of males would be harvested (Figure 4-C), which would lead to even lower bull:cow ratios under this scenario. However, if the herd is stable or moderately increasing, the bull:cow ratio will remain about the same or increase under levels of harvest up to 3% of the herd with any sex ratio.

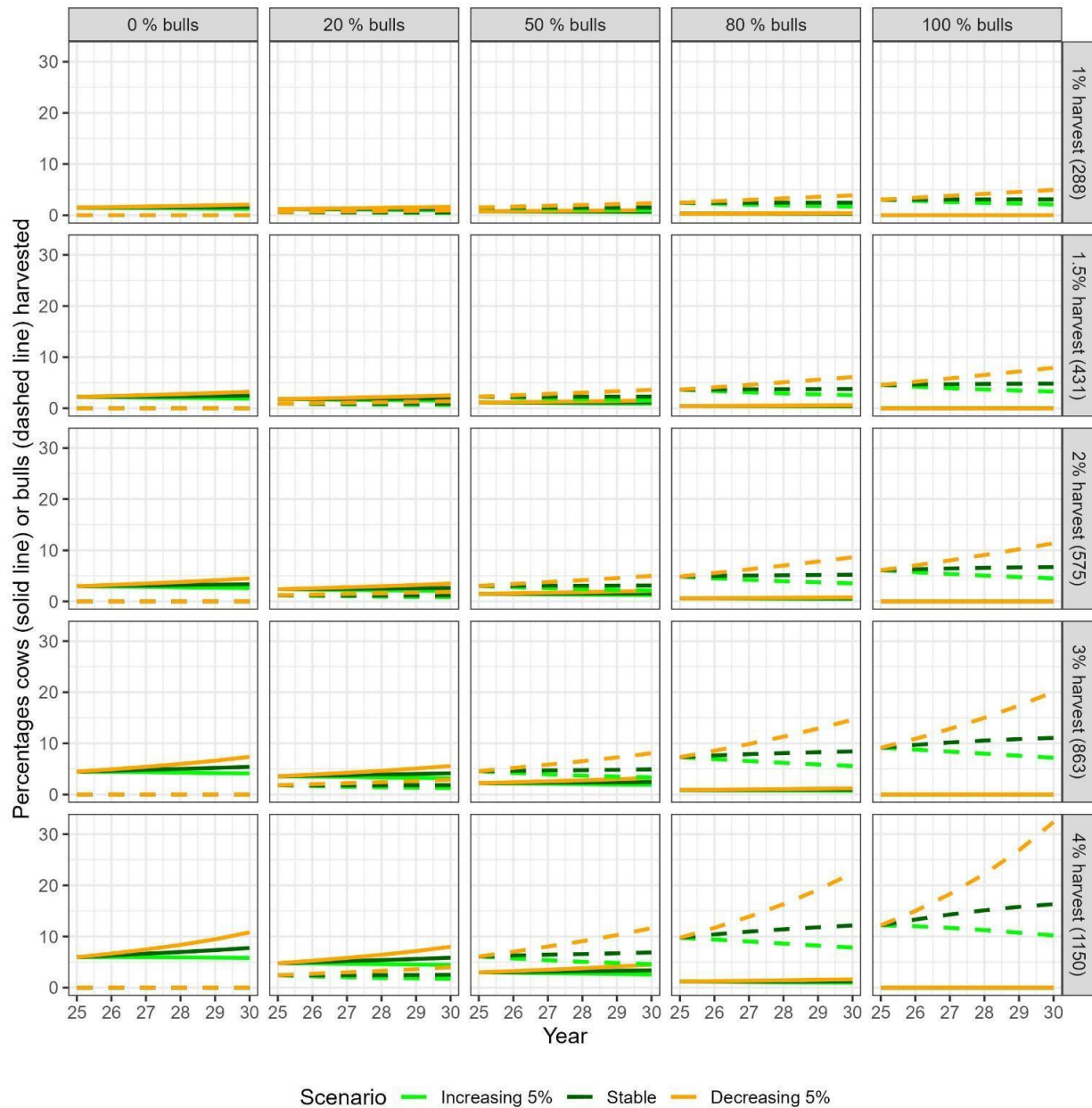


Figure 4-C. Proportion of the Sahtì Ekwò (Bluenose-East barren-ground caribou herd) harvested from 2025-2030 across a range of harvest and demographic scenarios (increasing at 5%/year, stable, and decreasing 5%/year). Solid lines indicate female trajectories and dashed lines indicate male trajectories. Harvest is expressed both as the percentage of the 2025 herd estimate (28,579) and number of caribou harvested.

Summary

The general results of harvest models suggest that the Sahtì Ekwò (Bluenose-East barren-ground caribou herd) can tolerate moderate levels of harvest with minimal impact on overall herd status. The underlying herd trend will continue to be the dominant trend, given the harvest levels considered, and will be modified slightly by harvesting. Sex-specific impacts of harvest should be considered when setting harvest

limits and the sex ratio of the harvest. At the same harvest level, the effect of harvest on bulls will be greater given the lower number of bulls compared to cows in the Bluenose East herd. We also emphasize that monitoring of harvest numbers greatly improves the ability to model and understand herd dynamics.

References

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, NT. Manuscript Report 262.

Boulanger, J., J. Adamczewski, J. Williams, S. Goodman, K. Clark, R. Abernathy, and L. LeClerc. 2024. June 2023 Calving Ground Surveys: Bluenose-East and Bathurst Barren-Ground Caribou Herds. Environment and Climate Change, Government of Northwest Territories, Yellowknife, NT.