Wek'èezhìı
Renewable Resources Board

September 9, 2024

Tammy Steinwand-Deschambeault, Director
Department of Culture & Lands Protection
Tłı̨chǫ Government
Email: tammy.steinwand@tlicho.ca

Heather Sayine-Crawford, Director
Environment and Climate Change
Government of the Northwest Territories
Email: heather_sayine-crawford@gov.nt.ca

Via Email
tammy.steinwand@tlicho.ca
heather_sayine-crawford@gov.nt.ca

Re: Information Request – 2024 Sahtì Ekwǫ̀ Management Proceeding

Dear Ms. Steinwand-Deschambeault and Ms. Sayine-Crawford:

On August 1, 2024, Environment & Climate Change (ECC), Government of the Northwest Territories (GNWT) and Tłı̨chǫ Government (TG) submitted a joint management proposal, entitled *"Joint Proposal on Management Actions for the Bluenose-East Barren-ground caribou (*Sahtì ekwǫ̀) *Herd 2024-2026*" ("the Proposal") to the WRRB, outlining proposed management actions for Sahtì Ekwǫ̀ in Wek'èezhìı. Following an initial assessment of the Proposal, the WRRB determined that a **modified Level 1 review** is appropriate, as per its Rule for Management Proposals. The Board opened the 2024 Sahtì Ekwǫ̀ Management Proceeding on August 19, 2024.

Following review of the Sahtì Ekwǫ̀ joint management proposal by all Parties, the WRRB has prepared and attached a list of information requests for both TG and GNWT's response. **Responses must be received by no later than 5:00 p.m. on September 23, 2024.**

If you have any questions, please contact our office at (867) 873-5740 or jpellissey@wrrb.ca.

Sincerely,

Joseph Judas
Chair

Attachment

Cc Michael Birlea, Manager
Culture and Lands Protection, Tłı̨chǫ Government

Dr. Brett Elkin, Assistant Deputy Minister, Director, Wildlife and Forest Management
Environment and Climate Change, Government of the Northwest Territories

2024 Sahtì Ekwǫ̀ Management Proceeding – Information Requests

Information Request #1: Trends in Adult Male Sex Ratio

i) Please provide information including possible sampling error to explain the abrupt and persistent jump of 35 bulls:100 cows to 62:100 cows between 2019 to 2020 from fall composition counts (Joint TG GNWT 2024 proposal; Figure 5). In particular, provide any evidence to support the assumption that the sex and age classes are well mixed during the rut. Is GNWT aware of any other examples of changes in adult sex ratio in other herds especially in herds recovering after a decline?

ii) Please provide information on any collar movements in 2019 and 2020 that would support an unexpected immigration of bulls or emigration of cows to explain the abruptness of the change in sex ratio. Boulanger et al. (2024) refer to further analyses to use modeling to assess if and how bull fidelity may have affected bull:cow ratios. When will the analyses be available?

iii) Please provide information such as a graph to illustrate how the sex ratio varying from 35 bulls:100 cows to 62:100 cows impact the estimate of herd size?

iv) Are there implications of the 2019-2020 abrupt change for future monitoring fall composition including sampling design and analyses?

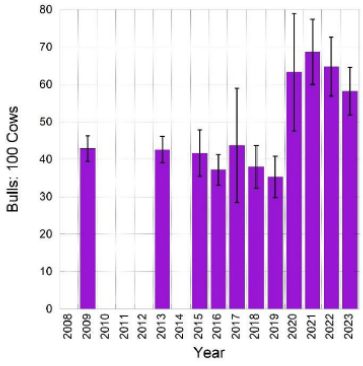

Figure 5. Fall (October) bull:cow ratios estimated in the Bluenose-East herd 2009-2023. Means are shown with 95% CI

Parties Responsible: Environment & Climate Change, GNWT

Rationale for IR #1: It will be useful to the Board as background for management decisions to have more information on the sudden change in the adult sex ratio as the ratio is used to extrapolate calving ground estimates to herd size and herd size is used to estimate harvest sustainability. The fit between the IPM model projections and field measurements switched between 2019 and 2020 from an under fit to an over-fit of the field measurements when the field measured ratio abruptly increased (Boulanger et al. 2024; Figure 44).

The concern about an unexplained jump in the adult sex ratio is whether it could be reversed or amplified and consequent implications for extrapolating herd size. The relationship between herd size and the bull:cow ratio will impact the sustainability of the proposed harvesting – for example, the difference between 38 bulls:100 cows and 68 bulls:100 cows can be estimated as adding or subtracting about 6,000 caribou in the extrapolation of the 2023 estimated breeding cows to herd size. This is a consideration in assessing sustainability of the proposed harvest.

Information Request #2: Trends in Adult Cow Survival

i) Please describe field evidence for if and how collared Sahtì Ekwǫ̀ cows have a lower survival rate than caribou without a collar. For example, does annual variability for caribou capture (deeper snow, average chase, and handling time), duration of collar life, size and weight of collars contribute to any bias. Please include a comparison with reports of collars impacting cow survival (see citations in the report for the Advisory Committee for Cooperation on Wildlife Management (ACCWM 2022).

ii) Please assess if and how the reduced survival of collared cows could result from sampling errors during capture such as a disproportionate selection of older age classes relative to the herd's age structure.

iii) Please provide information on monitoring survival specifically to test for an impact of collaring and collars and how to mitigate it given that the Joint TG GNWT 2024 proposal recommends continuing to maintain the annual number of collars at 70 male and female collars. Please consider how to apply the survival rates in herd management if the survival rates are biased by the collars.

Parties Responsible: Environment & Climate Change, GNWT

Rationale for IR #2: The Joint TG GNWT 2024 proposal suggests that survival rates based on collared caribou may be underestimated because of the impact of the capture and wearing a collar. The Joint TG GNWT 2024 proposal advanced the suggestion about the reduced collar survival rates because the 2020-2022 measured rates are consistent with a stable trend in herd size while the estimated herd size from the calving ground surveys 2018-2015 is an increasing trend. The proposal states (p.4),

> *Annual estimates of Bluenose-East collar-based cow survival for 2020 (83%), 2021 (85%) and 2022 (81%) averaged 83%, consistent with a stable trend (Figure 2). In an increasing herd, cow survival is expected to be in the 90% range (Crête et al. 1996). Studies of Alaskan migratory caribou suggest that collar-based cow survival can sometimes underestimate true survival (Haskell and Ballard 2007).*

The impact of collars has been a long-term concern and the ACCWM undertook a review. The ACCWM (2022) review cited Rasiulis et al. (2024) who used field data to report lower survival for caribou fitted with an earlier (heavier) type of satellite collar (1.63 kg; 68% survival) compared to a cows fitted with a radio collar (514 g; 86% survival) during a decline in herd size. Two modeling papers examined collar-based survival rates for the Western Arctic caribou herd. Haskell and Ballard (2007: Table 2) reported substantially adjusted field estimates for survival (from 78% to 90% for 3–13-year-old cows) to fit their modelled trend in herd size and did not have field or direct evidence of collared females having reduced survival. Using a different modelling approach, Pritchard et al. (2012) revealed that the duration of being collared impacted survival as collared individuals became less representative of a herd's age structure. But the applicability of this modeling to the Sahtì Ekwǫ̀ is less useful as collar duration is relatively brief and in any case the difference between modelled and field survival rates was relatively minor at 3-4%.

Information Request #3: Measuring Herd Recovery and Risk of Type II Error

i) Please undertake a power analysis to describe the sensitivity of the proposed 2025 calving ground survey to measure "the true rate of herd increase" (Joint TG GNWT 2024 proposal p. 8).
ii) Please describe contingencies to assess the trend in Sahtì Ekwǫ̀ estimated herd size if the 2025 calving ground survey is incomplete, has low precision or increased bias due to late spring snowmelt or other weather conditions.
iii) Please describe how GNWT can rule out any possible sources of error that could potentially result in an overestimate of the population.

Parties Responsible: Environment & Climate Change, GNWT

Rational for IR #3: The Board requires information to avoid assuming that recovery (an increasing trend) is underway when, in fact, the herd is not recovering (Type II error) but is stable or declining. Inuit and Tłı̨chǫ ground observations are clear that summer conditions are beneficial for caribou health including productivity, (but not adult survival). However, inconsistencies in the technical monitoring cause uncertainty as there are two interpretations about the extent of recovery (rate of increase) and thus, the sustainability of proposed harvest changes.

First, the IPM modelling using measured productivity and survival are a close fit with the trend based on the calving ground estimates except the model under-estimated 2023 estimated breeding females Boulanger et al. 2023; Figure 36; this also happened before in 2010). If the trend in herd size is stable from 2018 to 2023 (Figure 36), the proposed harvest (845 caribou) relative to, for example, the average or upper 95% confidence interval for the 2021 estimate adult caribou (27,971 caribou) could be 3.2-4%.

Alternatively, Boulanger et al. (2024) estimated the annual rate of increase as 6-11% using a combination of under-estimation of herd size in 2021 and possibly 2018; under-estimation of cow survival rates and potentially undetected immigration. Based on the proposed estimated herd size in 2023 (845/39,525), the harvest rate would be two.%.

The Joint TG GNWT 2024 proposal states that:

> *Although we are confident the Bluenose-East herd has increased, the discrepancy between the apparent rate increase from 2021 to 2023 based on calving ground surveys and other demographic indicators suggests caution in interpreting the true rate of herd increase until a further population estimate is available. (reviewer's underlining)*

It will be useful to the Board to have the information about how confident GNWT is that the proposed 2025 calving survey can resolve the uncertainties about trend in herd size, any contingencies available if conditions are unfavorable for the 2025 calving ground survey, and the risks of delays in information on the sustainability of the harvest especially during these early days of recovery. The previous calving ground surveys experienced weather interruptions and/or poor sighting conditions during four of the previous five surveys, which included that the 2018 and 2021 were "somewhat low" estimates (p.8). A remaining question is whether the 2023

estimate could be an overestimate. GNWT notes that their IPM model underestimated the 2023 estimate using the field measured vital rates (Boulanger et al. 2024; Figure 36).

Information Request #4: Measuring Objectives

Please provide the management objectives (measurable endpoints) that follow from the short-term goal (2024-2026) which is *"to promote conditions that will allow for continued growth of the herd"*. In the context of the Sahtì Ekwǫ̀ recovery, please define sustainability as a measurable objective.

Parties Responsible: Tłı̨chǫ Government and Environment & Climate Change, GNWT

Rationale for IR #4: It will be useful for the Board to know how the monitoring and modeling meet a target for recovery. The Joint TG GNWT 2024 proposal emphasizes conservative and sustainable harvest strategies but without providing specifics such as what is a conservative rate of recovery over only a 3-year period and how to recognize annual progress based on measurable endpoints.

> *"Harvest modeling conducted using the most recent population and demographic estimates for the Bluenose-East herd suggests that a total harvest of 2.1% of the herd, whether bulls, cows or a mix of the two, is likely to be sustainable and allow for continued herd growth (Boulanger et al. 2024 Appendix 5)." (Joint TG GNWT 2024 Proposal p.15).*

The Board needs more information to assess the likelihood of sustainability. The problem is the uncertainties including the discrepancy between adult female survival rates and trend in herd size and whether wolf management will be continued. The modeled harvest rate of 2.1% is only sustainable based on using adult and calf productivity rates in two scenarios that are higher than the measured rates (2018-2023). The model runs started with the 2023 estimated herd size and only ran for 3 years. There was no mention of whether the proposed 2025 herd estimate and rates could be used as criteria (benchmarks) to assess the applicability of the model scenarios.

Information Request #5: Monitoring Recovery

Please provide information on the risks to recovery from changes in the technical monitoring of the Sahtì Ekwǫ̀ herd (Table 4) especially the proposed higher priority for monitoring summer relative to winter calf survival. Please include information on sampling and statistical procedures which could compensate for possible overlapping herd distribution while sampling sex and age composition monitoring.

Parties Responsible: Tłı̨chǫ Government and Environment & Climate Change, GNWT

Rationale for IR #5: The Joint TG GNWT 2024 proposal (Table 4) has changes in the frequency of calving ground estimates and a reduction in sex and age composition. More information is needed to understand the implications of reducing the frequency of technical monitoring despite uncertainty about to what extent the Sahtì Ekwǫ̀ herd is recovering, uncertainty about the sustainability of the proposed harvesting, and whether wolf management will continue. It is not clear why if adult survival is biased low, there are no changes to

maintaining the collar monitoring or changes to monitoring adult sex ratio if it is uncertain as to the extent of its changes.

Having information about whether overlapping herd distribution is an insoluble problem for sex and age composition surveys is needed to understand whether assigning a higher priority to fall than spring composition is justified. The current uncertainties of relying on trend in herd size from the calving ground surveys increases the importance of annually estimating vital rates including over winter calf survival. In this context, reducing the frequency of calving ground sex and age composition to estimate productivity and early calf survival increases uncertainty and reduces the baseline to use the Tłı̨chǫ estimates of summer calf survival.

Information Request #6: Range Condition Dynamics

i) Please provide information on range condition dynamics of Sahtì Ekwǫ̀. What has been done to measure how range condition may change to support caribou recovery?

ii) Has the GNWT considered if the Sahtì Ekwǫ̀ subpopulation, or its range condition, is cyclic? What evidence is there that they may or may not? What are the implications for herd recovery management if the Sahtì Ekwǫ̀ herd is cyclic?

Parties Responsible: Environment & Climate Change, GNWT

Rationale for IR #6: There is evidence that many, if not most, barren-ground caribou populations cycle. Bongelli et al. (2020) found that of the 11 barren-ground caribou sub-populations tested, nine fit a sine cycle. Bongelli et al. (2020) also looked at how well the sine curve fits the census data considering all nine sine-cyclic subpopulations as a group. Ninety-six percent of the pooled survey variance was explained by the subpopulation specific period/amplitude generated expected values, with the probability of no relationship at $p<0.001$ (subpopulations R^2 values ranged between 0.770-0.999). Bongelli et al. (2020) further showed that the main driver of the cycle appeared to be range size and range productivity. It appears that carrying capacity of barren-ground caribou is not constant, but rather, fluctuates. Therefore, range recovery is required before caribou recovery can begin.

Given that barren-ground caribou density effects appear mainly environmental, the implications are that other factors such as predation or harvest, may have less of an impact on barren-ground caribou population dynamics than currently assumed. Having empirical evidence of how range condition is changing will help predict caribou population changes between censuses and further validate range-caribou dynamics as a new understanding.

References

Advisory Committee for Cooperation on Wildlife Management (ACCWM). 2022. Monitoring Caribou: A review of selected technologies for tracking barren-ground caribou. https://static1.squarespace.com/static/5d24b5101204ac00011a8705/t/650b5c0a5da4cd64ee9385d1/1695243285223/Collars+Final.pdf

Bongelli, E., Dowsley, M., Velasco-Herrera, V.M., and Taylor, M. 2020. Do North American migratory barren-ground caribou subpopulations cycle? *Arctic.* 73: 326-346.

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 the Northwest Territories. Manuscript Report 319.

Haskell, S.P. and W.B. Ballard. 2007. Modeling the Western Arctic caribou herd during a positive growth phase: Potential effects of wolves and radio collars. Journal of Wildlife Management 71:619-627.

Prichard, A.K., K. Joly and J. Dau. 2012. Quantifying telemetry collar bias when age is unknown: a simulation study with a long-lived ungulate. The Journal of Wildlife Management 76:1,441–1,449; DOI: 10.1002/jwmg.394.