



November 26, 2018

Dr. Philippa Benson  
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*Science Advances Journal*  
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Dear Dr. Benson,

Thank you for making science accessible outside of academia by providing open access publishing. We feel it's important to broaden public access to important science, especially to a journal such as *Science Advances* that promotes and upholds the highest standards in the conduct and communication of scientific research.

We look forward to seeing research that furthers our understanding of northern and arctic ecosystems and management where our members live and operate, and we continue to promote and support independent research in topics as germane as caribou, habitat management and harvest.

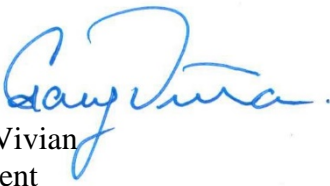
We understand that we are able to submit an e-letter to your journal, and offer the text attached as an e-letter with our thoughts on the recent paper *Undermining subsistence: Barren-ground caribou in a "tragedy of open access*, by Parlee *et al.*

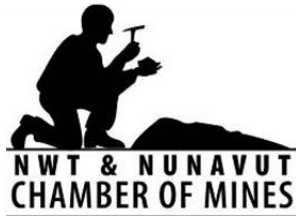
In the work that our members do – professional biologists among them too – we clearly see that management of barren ground caribou is a complex problem, one that involves huge areas of land, stakeholders from many different communities, and many layers of government. Collecting consistent data is difficult, and determining policy based on those data is harder still. Researchers must ensure that their published work is as accurate and objective as possible: the margins for error are small, particularly for the Bathurst herd, and management policies based on weak or mistaken evidence may prove disastrous. We hope that future contributions from Parlee *et al.* will better reflect this responsibility.

Thank you very much.

Yours truly,

**NWT & NUNAVUT CHAMBER OF MINES**

  
Gary Vivian  
President



## E-Letter to the Editor:

### Lines on maps do not affect caribou: a brief summary of the fatal errors in *Parlee et al*

Parlee *et al*<sup>i</sup> examined the causes of the dramatic population decline of the Bathurst barren ground caribou herd. The authors had two aims. First, using harvest data from the Porcupine herd, they **tried to show** that Indigenous hunters cannot be the cause of the decline because they actively reduce their hunting harvest during periods of population decline. Second, the authors claimed that a dramatic increase in mining activity is the main cause of the decline, particularly in the Bathurst herd. Unfortunately, the authors were keener on assembling evidence in support of their claims than attempting an objective assessment of their veracity, which reduces the value of their contribution.

With respect to their first aim, it is certainly plausible that the Indigenous caribou harvest has been managed at the community level to ensure the long-term viability of barren ground caribou, but the authors' analyses are too simplistic to shed light on this issue. Using population data from the Porcupine herd and three other western barren-ground caribou herds, which collectively declined from 380,000 animals around 1990 to 230,000 around 2006 before rebounding, the authors used self-reported harvest data from the Inuvialuit Harvest Study<sup>ii</sup> and Gwich'in Harvest Study<sup>iii</sup> to show that *per capita* (i.e., per person) harvest does appear to decrease as the caribou population declines (Figures 4 and 5 in Parlee *et al.*). In their analysis, the authors fail to consider the role of the Porcupine Caribou Management Board (PCMB) in managing harvest during this period. The regulation of harvest by the PCMB, which includes the five Indigenous communities that rely on Porcupine caribou, and territorial and federal agencies, has been informed by science and traditional knowledge since 1987. There is no reason to presume that similar harvest responses would occur naturally in other herds without co-management boards in place. As a result of long-term active co-management, the Porcupine herd has recovered and is currently in the "green zone", i.e., no restrictions on subsistence harvest.

Further, because harvesting from a smaller wildlife population is more difficult, per person harvest may decline even in the absence of active conservation measures. Moreover, if the hunter population is rising, a smaller per person harvest may mask a higher total harvest. Figures 4 and 5 thus do not present any compelling evidence for active management of caribou harvesting by the Indigenous community. Instead, the authors should have presented the total number of animals harvested per year, and the proportion of the herd harvested in that year. If the subject of interest is the wildlife population, the effects of limiting factors, like harvest, are properly determined relative to the wildlife population (e.g., proportion of caribou herd harvested in a year; as in Boulanger *et al.* 2011), not relative to the human population as in Parlee *et al.* (2018).

Parlee *et al.* did not discuss harvesting data for the Bathurst herd. This is unfortunate because harvesting of Bathurst caribou was examined in detail in an article by Boulanger *et al.*<sup>iv</sup>, who estimated that the population trajectory of the Bathurst herd was best explained by an average harvest of 5000 animals per year, even as the caribou population declined. It is incumbent on Parlee *et al.* to explain how this result is compatible with their hypothesis of active hunting management by the Indigenous community. The Boulanger *et al.* article also apparently refutes their assertion that "there is no evidence that Indigenous harvest practices have had any influence on caribou population dynamics".

The second part of the Parlee *et al.* article focused on the effects of industrial activity in the ranges of the Porcupine and Bathurst herds. They claimed that "[o]ver 30 million hectares [300,000 km<sup>2</sup>] of land in the Northwest Territories have been disturbed as a result of mineral staking, exploration, construction, and

project development.” The authors have conflated mineral staking with mining exploration, construction and operation. Mineral staking simply involves placing wooden posts in the ground to identify the boundary of the claim, and that information is then presented as lines drawn on maps to delimit claims. Nothing is done until exploration work begins and typically, only select areas are explored and the majority of a claim is never developed. To illustrate, the working group for the Bathurst Caribou Range Plan (a multi-stakeholder land management group made of up Aboriginal, Government, NGO and industry representatives) calculated the area of direct habitat loss in the Bathurst range, along with indirect disturbance within a much larger precautionary zone of influence surrounding industrial sites, roads, and communities<sup>v</sup>. Direct habitat loss due to all factors was calculated as 181 km<sup>2</sup>, while surrounding disturbed areas accounted for 20,000 km<sup>2</sup>. Industrial activity accounts for 70 km<sup>2</sup> of direct habitat loss, and approximately 5,900 km<sup>2</sup> of disturbed areas, which is inconsistent with Parlee *et al.*’s stated area of 300,000 km<sup>2</sup>.

Since Parlee *et al.*’s Figure 8 mistakenly included claim activity as disturbance, we have created the equivalent map with claim activity excluded (our Figure 1). Actual industrial disturbance only affects a tiny fraction of the Bathurst range, about 1.4%.

Parlee *et al.* also stated that mineral activity has been increasing exponentially (without citation). However, this statement is inconsistent with data collated by the NWT and Nunavut Chamber of Mines, which show a decrease in mining investment (and therefore active exploration using helicopters and tented camps) from approximately \$200 million/year in 2007 to less than \$90 million in 2018. Meanwhile, the amount of active mining activity has remained constant or declined during this period<sup>5</sup>.

Management of barren ground caribou is a complex problem, one that involves huge areas of land, stakeholders from many different communities, and many layers of government. Collecting consistent data is difficult, and determining policy based on those data is harder still. Researchers must ensure that their published work is as accurate and objective as possible: the margins for error are small, particularly for the Bathurst herd, and management policies based on weak or mistaken evidence may prove disastrous. We hope that future contributions from Parlee *et al.* will better reflect this responsibility.

Attachment: *Figure 1: Effect of Zone of Influence Distances used in Predicting Effects on Caribou*

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<sup>i</sup> Parlee et al, 2018, Science Advances

<sup>ii</sup> Inuvialuit Joint Secretariat, Inuvialuit Harvest Study: Data and Methods Report 1988-1997 (Inuvialuit Joint Secretariat, 2003).

<sup>iii</sup> I. McDonald, Gwich’in Renewable Resources Board, Gwich’in Harvest Study: Final Report (Gwich’in Renewable Resources Board, 2009).

<sup>iv</sup> Boulanger et al, 2011, J Wildlife Management

<sup>v</sup> Bathurst Caribou Range Plan, January 2018.

**Figure 1**  
**Effect of Zone of Influence Distances**  
**used in Predicting Effects on Caribou**

