



Nunavut Impact Review Board (NIRB)
PO Box 1360
Cambridge Bay, NU
XoB oCo

July 11th, 2023

Dear NIRB,

Subject: Parks Canada's Comments on Baffinland Iron Mines Corporation's Mary River Project 2022 Annual Report

Parks Canada appreciates the opportunity to provide comments on the Mary River Project 2022 Annual Report submitted by Baffinland Iron Mines Corporation (BIMC) to the Nunavut Impact Review Board (NIRB) as requested by the NIRB in the May 26, 2023 correspondence. Parks Canada is providing comments attached in the table below, with respect to:

Effects Monitoring

- a. Whether the conclusions reached by Baffinland in the 2022 Annual Report are valid; and
- b. Any areas of significance requiring further supporting information or any changes to the monitoring program which may be required.

The decline of narwhal abundance in Eclipse Sound is of considerable concern to Parks Canada. Narwhals play a significant role in the marine ecosystem of Tallurutiup Imanga National Marine Conservation Area (TI NMCA) and in the continuation of Inuit cultural practices. Further, as previously raised in our comments on BIMCs 2019, 2020 and 2021 Annual Monitoring Reports, the review schedule for comments on monitoring reports and the process for resolution of associated issues prior to each shipping season needs to be improved.

Parks Canada is not providing any comments regarding compliance monitoring as we will not have a regulatory role for this project until TI NMCA is gazetted under Schedule 1 of the *Canada National Marine Conservation Areas Act*.

Parks Canada also notes that we support comments, relevant to the marine environment, provided by the Department of Fisheries and Oceans, Transport Canada, and Environment and Climate Change Canada.

If you have any questions, please contact Marie-Claude Martel at 581-398-3621, or by email at marie-claude.martel@pc.gc.ca.

Sincerely,

A handwritten signature in black ink, appearing to read 'L. Jonart', is written over a horizontal line.

Laurent Jonart
Area superintendent, Central Nunavut
Parks Canada Agency

Comment Number	PC-01
Subject/Topic	Timing of annual report submission to NIRB
References	N/A
Review Comment	This 2022 annual report presents results based on 2022 monitoring reports. We have not had an opportunity to work with the Marine Environment Working Group (MEWG) to discuss the 2022 monitoring reports or to resolve any outstanding issues. As a result, the information provided in this Annual Report does not reflect any recommendations that may be provided through the MEWG review of the document.
Conclusion/Requests	Parks Canada encourages BIMC to work with the NIRB, MEWG, and other relevant parties to determine a reporting and review schedule that allows for the inclusion of MEWG feedback to BIMC's monitoring reports and for the resolution of associated issues, prior to the preparation of annual reports.

Comment Number	PC-02
Subject/Topic	Trend in the estimated abundance of narwhals in the Eclipse Sound
References	2022 Marine Mammal Aerial Survey Program; Section 3.5.6 Abundance Comparison with Previous Years, page 85
Review Comment	<p>The report indicates: “A <i>decreasing trend in the estimated abundance of narwhal in the Eclipse Sound stock can be observed since 2004 (Figure 36)</i>” but it might be useful to know whether a breakpoint appears in the regression model.</p> <p>Is the decreasing trend still significant when considering only the years 2004, 2013 and 2016? If so, based on the mean and errors for these specific years, the slope is likely to be lower than the slope between 2016 and 2022, and the breakpoint around 2016 could therefore be associated with shipping activities.</p> <p>In any case, the same breakpoint approach could be used in Admiralty Inlet to compare absolute slope values between the two regions and thus inform on the degree of exchange between the two stocks.</p>
Conclusion/Requests	Parks Canada recommends that the proponent investigate if a significant breakpoint exists and whether it could be associated with shipping activities. Parks Canada also recommends that the absolute slope values between the two regions are compared to provide information about the degree of exchange between the two stocks.

Comment Number	PC-03
Subject/Topic	Definition of trend
References	2022 Marine Mammal Aerial Survey Program; Section 1.3 Adaptive Management Protocol, Pages 4 and 5
Review Comment	The report states: “ <i>For the threshold to be met, response in movement behaviour would need to be observed as a trend in the data across individuals...</i> ” in subparagraph 1.3.1, while the criteria in subparagraph 1.3.2 states: “ <i>A statistically significant decrease in the proportion of immature narwhal relative to baseline conditions</i> ”. Could you clearly define what a trend is? Does a non-significant trend trigger a response? In the same paragraph (i.e., 1.3 Adaptive Management Protocol), it would be beneficial to clarify what “degree of certainty” means in the sentence: “ <i>The pre-defined actions identified in the TARP describe the responses that Baffinland would implement should the corresponding threshold levels be exceeded and assuming there is some degree of certainty that the measured change is Project-related.</i> ” An appendix table summarizing the severity score and associated response might be useful.
Conclusion/Requests	Parks Canada requests that the proponent clearly define the trends and what triggers a response.

Comment Number	PC-04
Subject/Topic	Anthropic pressures
References	2022 Marine Mammal Aerial Survey Program; Executive summary, pages III and IV
Review Comment	<p>Anthropic pressures might be worth mentioning in the following examples:</p> <ul style="list-style-type: none"> • “<i>...with animals shifting between Eclipse Sound and Admiralty Inlet based on where habitat conditions may be more favourable that season (e.g., ice coverage, prey availability, predation pressure).</i>” • “<i>For the above reasons, the potential for climate-driven shifts in species distributions cannot be ignored as a potential driver of the recently observed changes in summer narwhal distribution in Eclipse Sound.</i>”
Conclusion/Requests	Parks Canada requests that the proponent consider including anthropic pressures in the discussion of shifting species distribution.

Comment Number	PC-05
Subject/Topic	Bowhead observations
References	2022 Marine Mammal Aerial Survey Program; Section 1.4 Existing Environment, page 8
Review Comment	The report indicates that “ <i>During Leg 1 of 2019, when bowhead were migrating through the RSA, the calculated abundance of bowhead in the RSA was 176 (15 July) and 1,291 whales (21–22 July) (Golder 2020a)</i> ” but, a few lines above it stated that “ <i>During eight years of shore-based monitoring conducted for Baffinland from 2013 to 2017 and 2019 to 2021, a total of 21 bowhead were recorded near Bruce Head (Thomas et al. 2014; Smith et al. 2015, 2016, 2017; Golder 2018c, 2020b, 2021b, 2022a).</i> ” Similarly, a total of 14 bowhead were recorded along the Northern Shipping Route during

	<i>three consecutive years of aerial surveys conducted between 2013 and 2015 during the open water period.”</i> For the sake of clarity, could you indicate where the 1291 bowhead whales were located in the Regional Study Area (RSA) and provide an explanation for the difference in numbers?
Conclusion/Requests	Parks Canada requests that the proponent provides additional details regarding the 1291 bowhead whale observations on July 21 and 22, 2019.

Comment Number	PC-06
Subject/Topic	Narwhal seasonal abundance in Eclipse Sound
References	2022 Marine Mammal Aerial Survey Program; Section 2.5.4 Survey Sightings, page 28
Review Comment	The report indicates that “ <i>a total of 1,040 sightings and 2,308 individual narwhals were recorded in Eclipse Sound grid and 328 sightings and 608 individual narwhal were recorded in Admiralty Inlet grid during the Leg 1 surveys.</i> ” Have these trends towards greater Eclipse Sound abundance at the start of the season also occurred in previous years? Is there a link with the date of sea ice break-up and/or start of the shipping season?
Conclusion/Requests	Parks Canada requests more information about/explanation for narwhal abundance in Eclipse Sound at the start of the season.

Comment Number	PC-07
Subject/Topic	Accounting for migrating narwhals in relative abundance data
References	2022 Marine Mammal Aerial Survey Program; Section 2.6.1 Narwhal, page 38
Review Comment	The report indicates that “ <i>In the Eclipse Sound grid, narwhal relative abundance in 2022 varied between systematic surveys ranging from 0.096 to 2.813 animals/km (see Table 5). In previous years, narwhal relative abundance ranged between surveys from 0.030 to 0.500 animals/km in 2019 (Golder 2020a), 0.000 to 0.773 animals/km in 2020 (Golder 2021a), and 0.000 to 0.685 animals/km in 2021 (Golder 2022c).</i> ” As mentioned in the previous paragraph, migratory narwhals could be included in the 2022 data and “ <i>Relative abundance during Leg 1 would be expected to be higher when counts include both narwhal migrating into the RSA to stay for the summer and narwhal migrating through the RSA to other areas for the summer, (e.g., Admiralty Inlet)</i> ”. If migrating narwhal were included in the 2022 data and not the 2021 or 2020 data, this could explain the observed differences in animals/km between years. If this is the case, the 2022 results should also be used with caution for interpretation.
Conclusion/Requests	Parks Canada requests that the proponent clarify whether migrating individuals were included in the 2020 or 2021 data and report the animals/km for each year in a consistent manner, if possible.

Comment Number	PC-08
Subject/Topic	Presentation of analyses
References	2022 Marine Mammal Aerial Survey Program; Section 3.4.2.1 Visual Survey, page 51, and throughout the report
Review Comment	Formulas used in analyses must be formatted in the report so that the formulas are legible. It is currently impossible to interpret any of the formulas in the report (for example, formulas are appearing with “ \square ” instead of the correct letters, numbers, or symbols).
Conclusion/Requests	Parks Canada requests that the proponent update the report, ensuring that all analysis formula symbols are formatted correctly.

Comment Number	PC-09
Subject/Topic	Direct and delayed effects of shipping on narwhal abundance at Bruce Head
References	2022 Bruce Head Shore-based Monitoring Report, Executive Summary, page ii
Review Comment	This report indicates that for narwhals, “ <i>Over the combined 2014 to 2022 monitoring period, the second highest relative abundance estimate at Bruce Head was observed in 2019, when shipping was highest</i> ”. This comment recurs frequently in the various reports and implicitly suggests that shipping does not affect narwhals and could even be beneficial. However, the effect of high shipping in 2019 could also be observed in 2020 and 2021 when narwhal numbers were lower. The direct and immediate impact of shipping, as well as the potential delayed effects and the long-term impact on narwhal movement and migration routes need to be demonstrated.
Conclusion/Requests	Parks Canada requests that the proponent avoids making generic statements that could potentially misrepresent the results and that the proponent provides a more comprehensive interpretation of the abundance data compared with shipping rates over all years of the study.

Comment Number	PC-10
Subject/Topic	Effects on primary behaviour
References	2022 Bruce Head Shore-based Monitoring Report, Section 6.4.1 Primary Behaviour, page 130
Review Comment	The report mentions “ <i>conflicting trends</i> ” in response to the presence of ships, but it's also important to note that, despite the different group responses, the presence of ships does seem to affect primary behaviour, especially for groups with immatures (as discussed on page 87).
Conclusion/Requests	Parks Canada suggests that the proponent revise the second paragraph on page 130 to discuss the effects vessels have on primary behaviours in different narwhal groups instead of portraying the results as conflicting because of the differences between groups. The paragraph can still highlight that the results should be interpreted with caution due to overall sample size and differences in group responses.

Comment Number	PC-11
Subject/Topic	Unrecorded behaviour interruptions
References	2022 Bruce Head Shore-based Monitoring Report, Section 7.0 SUMMARY OF KEY FINDINGS, page 140
Review Comment	The report mentioned that “ <i>Nursing behaviour was recorded during 30 of the surveys, of which five coincided with a vessel being present within 5 km of the focal group</i> ”. However, the number of nursing (and other) behaviours that were interrupted as the ship approached is not recorded. Would it be possible to adjust or implement an experimental design to investigate this question?
Conclusion/Requests	Parks Canada suggests that behaviours interrupted from approaching vessels may be valuable to investigate and the proponent should consider whether and how this could be included in the monitoring program.

Comment Number	PC-12
Subject/Topic	Multivariate statistical analyses
References	Proportion of Immature Narwhal (Early warning indicator) in Eclipse Sound and Admiralty Inlet from 2022 Aerial Survey Imagery, Section Introduction, page 3, 5
Review Comment	A complex biological response is often complicated to link to a single effect in a multi-stressor environment. Are you going to perform a multivariate analysis and selection model based on AICc, for example, to address the cumulative effect and perhaps rank the different stressors? In addition, why were other variables are not included in the models (e.g., date of sea ice break-up, number of ships, number of harvests)?
Conclusion/Requests	Parks Canada suggests that the Proponent consider completing multivariate analyses and using selection models to refine our understanding of biological responses and address cumulative effects.

Comment Number	PC-13
Subject/Topic	Statistical significance threshold
References	Proportion of Immature Narwhal (Early warning indicator) in Eclipse Sound and Admiralty Inlet from 2022 Aerial Survey Imagery, Section 3.2 Admiralty Inlet, page 11
Review Comment	The report states that “ <i>Results from the modelling analysis indicated the year effect was statistically significant ($P=0.059$). The model estimated that proportion of immature narwhal values in 2022 were statistically significantly lower than in 2020 ($P=0.083$)</i> ”. What is your p-value threshold for being significant? Is the threshold the same everywhere?
Conclusion/Requests	Parks Canada requests that the p-value threshold for statistical significance be explicitly stated throughout the report.

Comment Number	PC-14
Subject/Topic	Considerations for acoustic monitoring analyses
References	Baffinland 2022 Underwater Acoustic Monitoring. Section Executive Summary, page 2
Review Comment	Given that hydrophones are not deployed at the same depth (see Table 1: 275 vs 650 meters) and that there is a lot of variation in CPA, hypotenuse calculations reflecting the actual distance between the vessel and the hydrophone could be very useful. Distance-dependent sound attenuation models could also be very useful for more accurately characterizing vessel noise levels in the environment.
Conclusion/Requests	Parks Canada suggests that the proponent include additional detail and in the acoustic monitoring results, such as true distance between the vessel and the hydrophone and distance-dependent sound attenuation models to more accurately characterize vessel noise levels in the environment.

Comment Number	PC-15
Subject/Topic	Noise from project vessels
References	Baffinland 2022 Underwater Acoustic Monitoring Program (Open-Water Season)
Review Comment	The report states: “ <i>The results demonstrate that while noise from Project vessels is detectable in the underwater soundscape, vessel noise exposure is temporary in nature (detectable in 32 % of the recordings at most) and below sound levels that could cause acoustic injury. Assessed relative to a broadband SPL of 120 dB re 1 µPa (i.e., the current noise disturbance threshold standard used by industry and government for assessing disturbance to marine mammals by continuous type sounds such as vessel noise, and the threshold against which this project was assessed and approved), sound exposure duration averaged less than 1 hour per day</i> ”. It is unclear how noise from project vessels is only detectable in 32% of the recordings, but sound exposure durations averaged less than 1 hour per day. If project vessels are only detectable in 32% of the recordings, what is causing the sound exposure of an hour or less per day?
Conclusion/Requests	Parks Canada requests clarification regarding how the average sound exposure time per day correlates with the percent of detectable vessel recordings.

Comment Number	PC-16
Subject/Topic	Bivalve mortality
References	2022 Final MEEMP, p. 7/1180 of pdf (Chapter 5)
Review Comment	The report states: “ <i>Bivalve mortalities were observed opportunistically near and within quadrats in both the exposure and reference area in 2022. The cause of the mortalities could not be determined but does not appear to be related to changes in water quality or sediment quality. The apparent widespread nature of the bivalve mortalities, which occurred across multiple species and in both areas, suggest some other factor or factors were affecting marine bivalves. It is possible that the cause was a naturally occurring event involving the release of supercooled high salinity brine from</i>

	<i>sea ice, flowing to the sea floor</i> ". Based on what evidence or references can the proponent conclude that bivalve mortalities were not related to water quality or sediment quality. Does the proponent not consider salinity and water temperature to be part of water quality?
Conclusion/Requests	Could the proponent clarify whether there were changes in water quality due to project or project vessels (e.g. from ballast water discharge) and provide references to support conclusions about possible causes?

Comment Number	PC-17
Subject/Topic	Monitoring of macroflora and benthic epifauna assemblages
References	2022 Final MEEMP, p. 7/1180 of pdf (Chapter 5)
Review Comment	The report states: <i>"Power analysis results, in combination with a taxa accumulation curve generated for this dataset, indicate that the current sample size remains insufficient to reliably detect a project-induced change in community structure or fully characterize the epibenthic community. As such, the current statistical results should be interpreted with caution"</i> and later in the report states <i>"Overall, macrofloral and benthic epifaunal community assemblages were comparable between exposure and reference areas but varied interannually for some indicators, likely driven by regional environmental factors. The report also states that "Monitoring efforts to date revealed no evidence of overarching spatial or temporal trends that might be associated with project-induced effects from construction or operation activities and Milne Port. Monitoring of macroflora and benthic epifauna assemblages is recommended to continue using the same sampling and statistical design"</i> .
Conclusion/Requests	If there is insufficient power to reliably detect a project-induced change, why is the proponent interpreting the results so strongly and concluding "no evidence" of change related to project? This is contradictory and the proponent should clarify – or emphasize the caution in interpretation. Parks Canada suggest the proponent explain the value of this dataset for monitoring project effects when there is little statistical power to detect effects of the project as currently designed. If this is a qualitative assessment, it should be clearly stated, and interpretation of interannual variability driven by regional environmental factors should reference other studies to support these conclusions. Alternatively, the Proponent should consider increasing the sample size to ensure that that there is sufficient statistical power to detect project-induced changes.

Comment Number	PC-18
Subject/Topic	Water quality parameters
References	2022 Final MEEMP, Chapter 2
Review Comment	Interpretation of trends through time in water quality parameters (e.g., iron or copper) are not supported by statistical analyses but are qualitative and only based on a few stations (e.g., Figures 2-3 to 2-5; MP-05 and MP-06 only), and graphs do not present data prior to 2017 even though tables

	<p>contain data from 2016. Statistical analyses would help support conclusions and remove some of the subjectivity of conclusions that there are no changes through time.</p> <p>The report also states that “<i>all measurements downstream from the primary site discharges MP-05 and MP-06 in 2022 were within range reported from previous years</i>” (p.68, Appendix 2E-Table 1). However, being within the same range does not indicate any change through time in mean concentrations. Again, a statistical analysis to support conclusions would be required.</p>
Conclusion/Requests	<p>For select parameters (e.g., iron), the Proponent provides statistical analysis of changes in iron concentration between years. Alternatively, a Canadian Council of Ministers of the Environment (CCME) Water Quality Index (WQI) could be calculated, and this would perhaps better represent frequency and magnitude of exceedances, through looking at cumulative effects or changes in water quality (all parameters integrated) through time and spatially, including salinity and water temperature.</p> <p>It would also be useful to indicate in the water quality tables where the exceedances occurred, similar to how the sediment exceedances are reported in Appendix 3D.</p>