



TECHNICAL MEMORANDUM

DATE August 30, 2024

Reference No. CA0026317.6821-030-TM-Rev0

TO Lou Kamermans, Senior Director of Sustainable Development
Baffinland Iron Mines Corporation

CC Courtney Oliver; Jesse Manufor

FROM Phil Rouget

EMAIL philippe.rouget@wsp.com

FOLLOW-UP ON OCEANS NORTH RESPONSE TO WSP TECHNICAL MEMORANDUM (REFERENCE NO. 1663724-488-TM-REV0-77000: PROJECT SHIPPING LEVELS IN REGIONAL STUDY AREA PRIOR TO 2013)

This technical memorandum has been prepared in response to Oceans North's Response to WSP Technical Memorandum (Reference 1663724-488-TM-Rev0-77000: Project Shipping Levels in Regional Study Area Prior to 2013). Ocean North's response was submitted as part of the commenting period for Baffinland Iron Mines Corp. (Baffinland)'s 2023 Annual Report to the Nunavut Impact Review Board (NIRB) for the Mary River Project (NIRB File No. 08MN053).

1.0 BACKGROUND

On 30 November 2023, Baffinland produced a technical memorandum (WSP 2023a) in response to Fisheries and Oceans Canada (DFO)'s Technical Comment No. DFO-TRC-01 related to clarification on Project shipping levels in the Regional Study Area (RSA) prior to 2013, and the selection of 2013 as a baseline for the Eclipse Sound narwhal population. This technical comment was submitted by DFO as part of the environmental review process for Baffinland's Sustainable Operations Proposal (SOP). Subsequently, Oceans North provided a letter (Oceans North 2024) responding to the technical memorandum (WSP 2023a) as part of the commenting period for Baffinland's 2023 Annual Report to the NIRB for the Mary River Project (NIRB File No. 08MN053).

In their letter, Oceans North raised four points on why they believe 2004 should be used as a baseline year (in lieu of 2013) for the Eclipse Sound narwhal population. Each of these points is presented below, followed by a response by WSP/Baffinland relevant to each discussion item.

2.0 OCEANS NORTH COMMENTS

2.1 Significance of Issue

Oceans North comment: The arbitrary selection of a baseline and the exclusion of valuable data by the proponent suggests that there has been no change in the narwhal population, which Inuit have stated is not the case. Oceans North recommends that the decision on where the population stood prior to project shipping lies with the regulators (with input from communities and independent scientific experts) as opposed to the proponent.

Response:

The selection of 2013 as a baseline year was not an arbitrary process. It was based on a detailed statistical analysis of existing ship traffic data in the RSA relative to available narwhal abundance estimates. A detailed rationale on why 2013 is considered a more appropriate baseline year than 2004 is presented in WSP (2023a). Further supporting evidence is presented in Baffinland's formal response (BIMC 2024a) to DFO's technical comment DFO-02 (DFO 2024). The latter response included a regression model analysis of historical (2002–2017) shipping data derived from the Canadian Coast Guard (CCG)'s NORDREG Vessel Traffic Reporting for Arctic Canada records (CCG 2023), supplemented by existing shipping records from Fednav Ltd. This analysis followed the analytical methods recommended by DFO (DFO 2024). The analysis only included 2013 shipping that occurred prior to the 2013 abundance survey, since narwhal would have only be affected by shipping that occurred up to the point of the survey. Results from this analysis indicated that the statistical breakpoint (i.e., statistically significant increase) in Project shipping levels occurred in 2014 (BIMC 2024a). Given that the breakpoint is after the 2013 narwhal abundance estimate, 2013 is considered the most relevant, reasonable, and scientifically defensible reference year for the purpose of Project effects monitoring specific to the regional narwhal population. In summary, it is WSP's professional opinion that 2013 is the most appropriate baseline year for monitoring potential Project shipping effects on the Eclipse Sound narwhal stock.

Baffinland disagrees with Oceans North's statement that Baffinland excluded valuable data from its reports which suggested that that there has been no change to the narwhal population. On the contrary, as evidenced in Baffinland's annual report to the NIRB (BIMC 2024b) and related documentation submitted to the NIRB (WSP 2023, 2024), Baffinland has quantified how the population of the Eclipse Sound and Admiralty Inlet narwhal summer stocks has changed over the last two decades, both preceding and during Project shipping operations, including abundance estimates for 2004 and 2013. Results from Baffinland's Marine Mammal Aerial Survey Program (MMASP) have been compared to aerial survey results collected by DFO in the RSA prior to the start of iron ore shipping operations, which is limited to two survey years: 2004 (Richard et al. 2010) and 2013 (Doniol-Valcroze et al. 2015). Detailed results of Baffinland's multi-year aerial survey analyses (2016, 2019, 2020, 2021, 2022, and 2023) are presented in WSP (2024). A summary of all available abundance estimates for the Eclipse Sound narwhal stock are presented in Table 1 below (this table is also presented in BIMC 2024b and WSP 2024).

Table 1: Abundance estimates for Eclipse Sound summer stock based on aerial surveys (2004–2023)

Stock	Year	Abundance	CV	95% CI	Source
Eclipse Sound	2004	20,225	0.36	9,471–37,096	Richard et al. 2010
Eclipse Sound	2013	10,489	0.24	6,342–17,347 ^b	Doniol-Valcroze et al. 2015
Eclipse Sound	2016	12,039	0.23	7,768–18,660	Marcoux et al. 2019
Eclipse Sound	2019	9,931	0.05	9,009–10,946	Golder 2020
Eclipse Sound	2020	5,018	0.03	4,736–5,317	Golder 2021
Eclipse Sound	2021	2,595	0.33	1,369–4,919	Golder 2022
Eclipse Sound	2022	4,592	0.10	3,754–5,617	WSP 2023b
Eclipse Sound	2023	10,492	0.05	9,578–11,494	WSP 2024

Notes: CV = Coefficient of Variation, CI = Confidence Interval

As documented in Baffinland's annual MMASP reports (WSP 2023a, 2023b, 2024) and Baffinland's 2023 Annual Report to the NIRB (BIMC 2024), the first recognized decrease in the Eclipse Sound narwhal summer stock occurred between 2004 and 2013 prior to the start of iron ore shipping operations in the RSA in 2015, as outlined in Table 1 above (and as documented in WSP 2023a, 2023b, 2024). During this period, narwhal numbers in Eclipse Sound decreased from an estimated 20,225 animals in 2004 to 10,489 animals in 2013, although there is low confidence in the 2004 population estimate given the high variability ($CV = 0.36$) and wide confidence intervals¹ (9,471–37,096 animals) associated with this estimate (WSP 2023a, 2024).

2.2 Population trends and modelling data

Oceans North comment: All aerial surveys have some degree of estimation error. The 2004 narwhal population estimate has a larger error associated with it because survey transects were few and distant from one another. We suggest that rather than comparing a baseline estimate with a present-year estimate, it would be better practice to use all survey population estimates with their associated error estimates to model the local population trend (see Table 1 for all Eclipse Sound abundance estimates). A good example of the use of all surveys to model a population trend can be found in Biddlecombe et al. (2022) on Northern Hudson Bay narwhal population modelling. Their model uses survey estimates with varying precisions.

Response:

The comparison between the present-year estimate and the baseline year, referenced by Oceans North, is only one of the statistical analyses reported in WSP (2024). In addition to this comparison, a trend analysis that includes all years of data collected in Eclipse Sound and Admiralty Inlet was conducted (see Figure 1 below as an example from 2023 analysis). As Oceans North suggests, we do, in fact, follow the better practice of using all survey population estimates.

Although we agree with Oceans North's statement that all aerial surveys have some degree of estimation error, it is important to note that the error associated with the 2004 abundance estimate ($CV=0.36$) is much higher than the 2013 abundance estimate ($CV=0.24$) and subsequent estimates (Table 1). Given the high CV associated with the 2004 abundance estimate ($CI = 9,471\text{--}37,096$ animals), the use of that year's results as the baseline would mean that any comparisons to the baseline would be highly uncertain. This means that the understanding of changes in abundance over time would be limited.

Baffinland's responsibility is to monitor for Project effects on receptors of concern in the RSA (including, but not limited to, narwhal) and therefore the baseline should be reflective of when Project effects were likely to start occurring. In the case of shipping, this means 2014, as outlined in Section 2.1 and in BIMC 2024a). It is unreasonable to enforce upon a proponent a duty to monitor long-term population trends beyond a Project's operational timeline, particularly when there is limited information on the various other external stressors, such as climate change, harvesting, sea ice levels, prey availability, etc.

¹ Confidence intervals are used to measure uncertainty in an estimate of a population parameter based on results of a survey (i.e., it is a way to represent how 'accurate' an estimate is by presenting the possible range around the estimate). For example, in 2004, the Eclipse Sound narwhal stock may have been anywhere between 9,471 animals and 37,096 animals even though the mean estimate is presented as 20,225 animals.

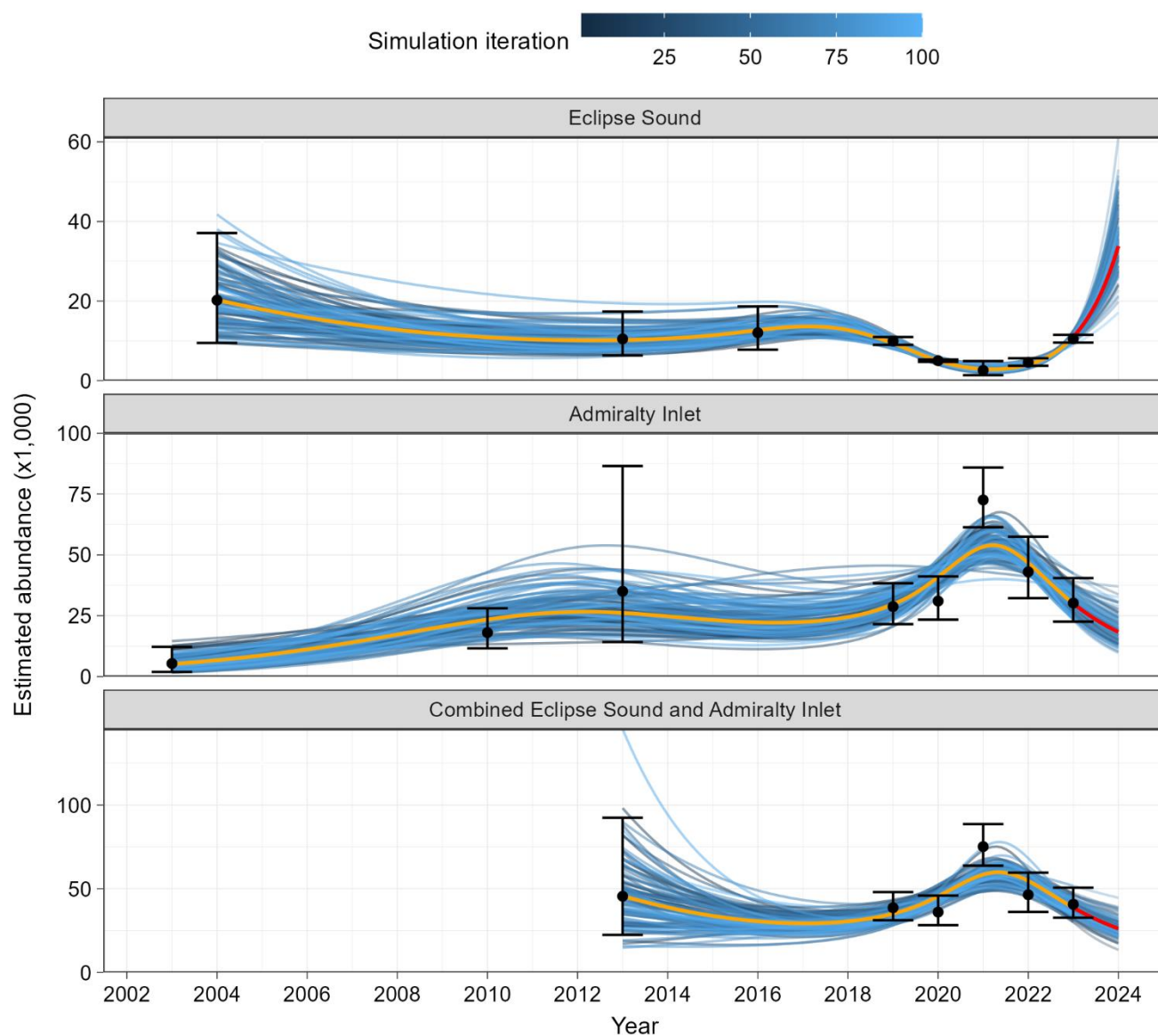


Figure 1. Trend analysis for Eclipse Sound, Admiralty Inlet, and the combined Eclipse Sound and Admiralty Inlet stock estimates using a resampling simulation method (from WSP 2024)

2.3 Baseline selection

Oceans North comment: It is an error to exclude the first population estimate (2004) we have of this narwhal population on the basis of shipping levels. The Baffinland analysis combines project ships and non-project ships in the Eclipse Sound area to justify the use of 2013 as a baseline, but these ships are not equal in their impact. Project ships move into critical narwhal habitat (Milne Inlet) while non-project ships do not. Non-project ships, which have been operating for decades in this region, mainly go through to Mittimatalik alone and exit out Navy Board Inlet or back into Baffin Bay.

Response:

Baffinland is not excluding the 2004 population estimate from its reporting; it is just not using 2004 as the baseline (reference) year for Project effects monitoring for the reasons aforementioned (BIMC 2024a; WSP 2023a).

Oceans North is incorrect in their statement that non-Project ships do not travel in Milne Inlet. A review of the historical shipping records in the North Baffin region confirms the presence of multiple non-Project vessels in Milne Inlet and Tremblay Sound throughout the summer period prior to 2013 (CCG 2023); including research vessels, Canadian Coast Guard (CCG) ships / icebreakers, and expedition/cruise vessels. The majority of these vessels also transited through Eclipse Sound (with some making stops in Mittimatalik), with some vessels also visiting Tremblay Sound.

Based on available IQ (JPCS 2017; QIA 2018, 2019), it is understood that narwhal calving grounds exist throughout all marine waters of the RSA (Eclipse Sound, Tremblay Sound, Navy Board Inlet, Milne Inlet, Koluktoo Bay) and in adjacent marine areas (Baffin Bay, Lancaster Sound, Admiralty Inlet, etc.). This information conflicts with Oceans North's suggestion that narwhal habitat in Milne Inlet is more important than other areas (noting Oceans North provides no evidence to support this statement).

Based on available IQ (JPCS 2017; QIA 2018, 2019) and from ongoing narwhal monitoring studies (Golder 2020; WSP 2023b; WSP 2024) and narwhal tagging studies (Golder 2020), narwhal travel freely between Eclipse Sound, Tremblay Sound and Milne Inlet within a single season (animals do not remain static within one part of the inlet during the open-water season). This lends little support to Oceans North argument that narwhal occurring in the RSA would be largely free from noise disturbance from non-Project vessels because non-Project vessels are spatially restricted to Eclipse Sound where narwhal numbers are low. As per available IQ, narwhal calving grounds exist across all waters of the RSA and beyond, not explicitly in Milne Inlet (JPCS 2017; QIA 2018, 2019). Eclipse Sound serves as a key migratory corridor for the summering herd, and during late summer/early fall (as freeze-up approaches), narwhal are more commonly distributed in Eclipse Sound than Milne Inlet (Golder 2020) when both Project and non-Project shipping operations remains active.

2.4 Comparing Admiralty Inlet to Eclipse Sound/Milne Inlet

Oceans North comment: Baffinland compares Admiralty Inlet to Eclipse Sound/Milne Inlet to justify the use of 2013 a baseline year. This is not a useful comparison unless it is agreed that Admiralty Inlet shipping is below a threshold of disturbance. Ships in Admiralty Inlet go to Nanisivik or Arctic Bay. They do not transit through the whole of Admiralty Inlet and are not moving into locations similar to Milne Inlet where narwhals are in high summering concentrations. Although they do occupy those areas, large numbers of narwhals can be found far south of those locations (See Fig. 3 Doniol-Valcroze et al. 2020).

Response:

The statement referring to Admiralty Inlet in WSP (2023a) was as follows:

“...shipping levels in Eclipse Sound prior to 2013 are similar to present-day shipping levels in Admiralty Inlet (Figure 3). Given that narwhal numbers in Admiralty Inlet have been stable and/or increasing in the last three years (WSP 2023), this level of shipping would not be expected to be correlated with a decline of narwhal. Hence, if the decline in narwhal numbers observed in Eclipse between 2004 and 2013 did in fact occur (acknowledging uncertainty with the 2004 estimate), this was unlikely due to shipping, otherwise a similar decline would be expected in Admiralty Inlet today, which is not the case (Figure 3).”

This statement is simply stating that the narwhal population in Admiralty Inlet is presently showing as stable (i.e., no signs of reduced abundance or displacement) even though animals in this area still experience some level of noise disturbance from non-Project vessels. Given that current shipping levels in Admiralty Inlet are similar to shipping levels in Eclipse Sound prior to 2013, it seems unlikely that shipping would have been the driver of the ‘possible’ decrease in narwhal abundance observed between in Eclipse Sound between 2004 and 2013 (while acknowledging the high uncertainty associated with the 2004 abundance estimate).

We do not agree with Oceans North’s statement that ships in Admiralty Inlet only go to Nanisivik or Arctic Bay and do not transit through the whole of Admiralty Inlet and are not moving into locations similar to Milne Inlet where narwhals are in high summering concentrations. Firstly, the Nanisivik facility was only operational between 1976 and 2002, so shipping related to this facility falls outside the timeline considered in the technical memorandum (2002–2017; WSP 2023a). Secondly, vessels visiting Admiralty Inlet during the 2002–2017 shipping period included sealift/cargo vessels, research vessels, Canadian Coast Guard (CCG) ships/icebreakers, and expedition/cruise vessels. Although many of these vessels made calls to Arctic Bay, multiple ships transited farther south in Admiralty Inlet, particularly expedition/cruise ships, where vessels would closely interact with marine mammal groups (including narwhal) as part of their wildlife viewing programs (Quark 2024).

Not only does Oceans North fail to provide evidence to support their claim that ‘ships are not moving into locations similar to Milne Inlet where narwhals are in high summering concentrations’, but existing narwhal monitoring results collected to date demonstrate otherwise (WSP 2024). For example, multiple years of aerial surveys undertaken in Admiralty Inlet show that the northern limits of Admiralty Inlet regularly support large concentrations of narwhal including waters near Arctic Bay (WSP 2024b). To this point, we refer Oceans North to the narwhal spatial distribution plots which are included in the annual MMASP reports (see Figure 2 below from the August 2023 survey as presented in WSP 2024). Previous work undertaken by DFO also clearly demonstrates that important narwhal habitat occurs in the northern extent of Admiralty Inlet (Breed et al. 2017). Oceans North also fails to acknowledge that narwhals in Admiralty Inlet do not remain static in one portion of the inlet throughout the open-water season, but rather move freely throughout the inlet and into Lancaster Sound, as evidenced through ongoing monitoring studies (Golder 2020; WSP 2024) and as supported by IQ (WMB 2016a; 2016b; QWB 2022). Telemetry studies (DFO 2020b) and available IQ (NWMB 2016a; 2016b; QWB 2022) also confirms that some degree of natural movement takes place by narwhal moving between Admiralty Inlet and Eclipse Sound within a single season. Satellite tagging data obtained from 1999 (Heide-Jorgensen et al. 2002), 2009 to 2011 (Watt et al. 2012), 2017 and 2018 (Golder 2020), and 2016 to 2018 (Marcoux and Watt 2020) provide additional evidence of narwhal use of both areas. So even if all ships that entered Admiralty Inlet

remained exclusively in the northern limits of the inlet (which we know is not the case), it would be incorrect to assume that narwhals would not be regularly exposed to shipping noise given their natural distribution and movement patterns in Admiralty Inlet and adjacent waters.

Oceans North’s comment that ‘Eclipse Sound/Milne Inlet needs to be assessed on its own, not as a comparison to a location where narwhals are not disturbed’ fails to acknowledge the benefit of having a valuable reference/control site where shipping levels have remained low and consistent throughout the last two decades.

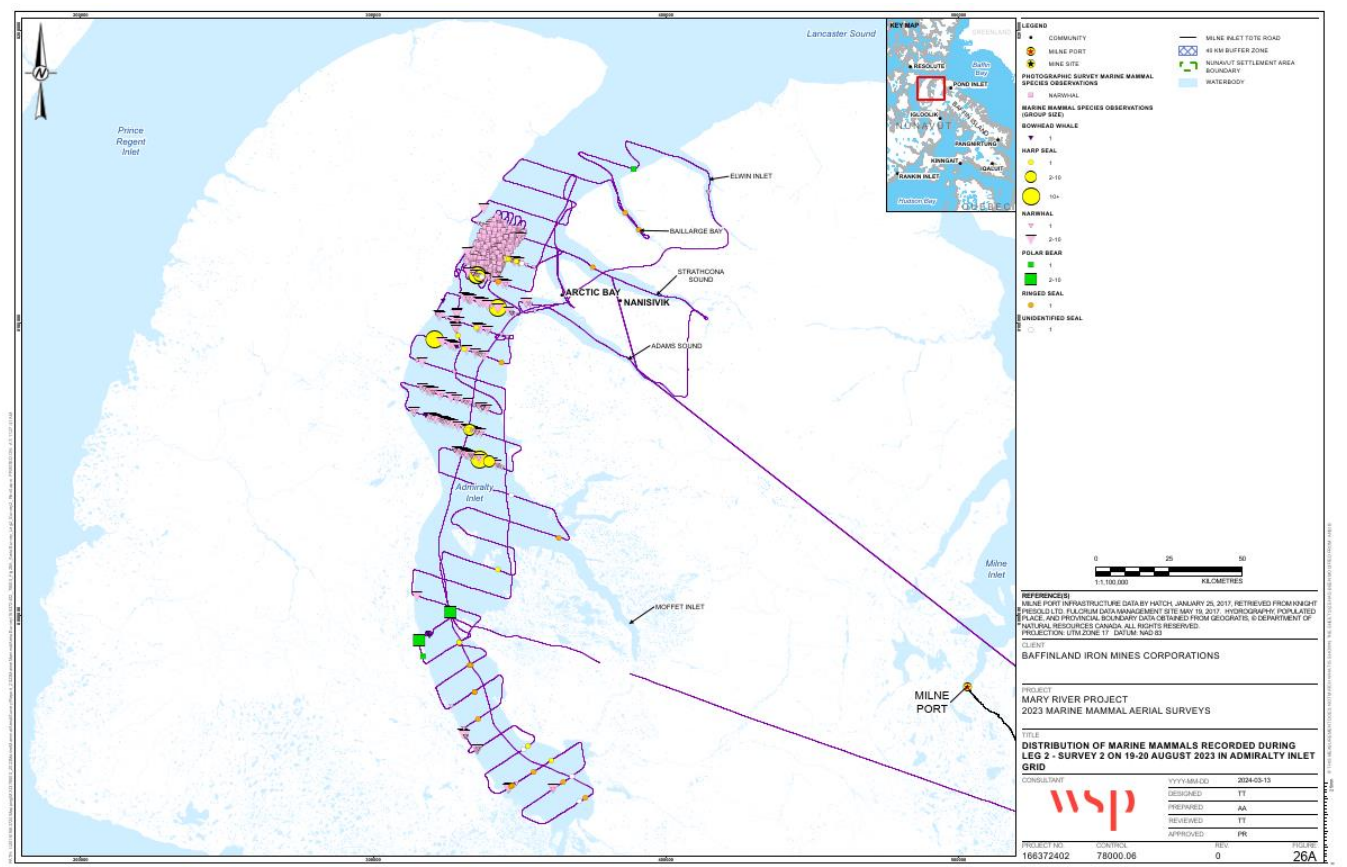


Figure 2 Distribution of marine mammals recorded during Leg 2 – Survey 2 as presented in WSP (2024).

3.0 CLOSURE

We trust the enclosed adequately responds to the issues raised by Oceans North in their letter. For any additional questions or information, please contact the undersigned.

WSP Canada Inc.



Patrick Abgrall, PhD
Senior Marine Biologist



Phil Rouget, MSc, RPBio
Principal, Senior Marine Biologist

PA/PR/lih

Attachments: Oceans North Response to WSP Technical Memorandum

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July 4, 2024

Oceans North Response to WSP Technical Memorandum (Reference No. 1663724-488-TM-Rev0-77000): PROJECT SHIPPING LEVELS IN REGIONAL STUDY AREA (RSA) PRIOR TO 2013

Dionne Filiatrault
Executive Director
Nunavut Impact Review Board
info@nirb.ca

Dear Ms. Filiatrault,

On November 30, 2023 Baffinland produced a technical memorandum in response to Fisheries and Oceans Canada's Technical Comment No. DFO-TRC-01 related to clarification on Project shipping levels in the Regional Study Area (RSA) prior to 2013, and the selection of 2013 as a baseline for the Eclipse Sound narwhal population. This technical comment was submitted by DFO as part of the environmental review process for Baffinland's Sustainable Operations Proposal (SOP). Following this submission, Oceans North raised questions about the selection of narwhal baseline population estimates in the January 2023 MEWG meeting and again at the May 2023 MEWG. Given the implications of the issue, we provide the following response to the memorandum and subsequent discussions on the topic in writing to all MEWG members and the NIRB. We submit this memorandum under the commenting period for Baffinland Iron Mines Corporation's (Baffinland) 2023 Annual Report for the Mary River Project (NIBR File No. 08MN053).

1. Significance of issue

The significance of this issue should not be underestimated. The arbitrary selection of a baseline and the exclusion of valuable data by the proponent suggests that there has been no change in the narwhal population, which Inuit have

stated is not the case. Oceans North recommends that the decision on where the population stood prior to project shipping lies with the regulators (with input from communities and independent scientific experts) as opposed to the proponent.

2. The population trend can and should be modelled on all data available

All aerial surveys have some degree of estimation error. The 2004 narwhal population estimate has a larger error associated with it because survey transects were few and distant from one another. We suggest that rather than comparing a baseline estimate with a present-year estimate, it would be better practice to use all survey population estimates with their associated error estimates to model the local population trend (see table 1 for all Eclipse Sound abundance estimates). A good example of the use of all surveys to model a population trend can be found in Biddlecombe et al. (2022) on Northern Hudson Bay narwhal population modelling. Their model uses survey estimates with varying precisions.

Table 1. Abundance Estimates for Eclipse Sound narwhal

Year	Abundance	CV	95% CI	Source
2004	20,225	0.36	9,471-37,096	Richard et al., 2010
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2021	2,595	0.33	1,369-4,919	Golder 2022
2022	4,592	0.10	3,754-5,617	WSP 2023

3. Selection of 2013 as a baseline is flawed

It is an error to exclude the first population estimate (2004) we have of this narwhal population on the basis of shipping levels. The Baffinland analysis combines project ships and non-project ships in the Eclipse Sound area to justify the use of 2013 as a baseline, but these ships are not equal in their impact. Project ships move into critical narwhal habitat (Milne Inlet) while non-project ships do not. Non-project ships, which have been operating for decades in this region, mainly go through to Mittimatalik alone and exit out Navy Board Inlet or back into Baffin Bay.

4. Eclipse Sound/Milne Inlet needs to be assessed on its own, not as a comparison to a location where narwhal are not disturbed

Baffinland compares Admiralty Inlet to Eclipse Sound/Milne Inlet to justify the use of 2013 as a baseline year. This is not a useful comparison unless it is agreed that Admiralty Inlet shipping is below a threshold of disturbance. Ships in Admiralty Inlet go to Nanisivik or Arctic Bay. They do not transit through the whole of Admiralty Inlet and are not moving into locations similar to Milne Inlet where narwhals are in high summering concentrations. Although they do occupy those areas, large numbers of narwhals can be found far south of those locations (See Fig. 3 Doniol-Valcroze et al. 2020).

Oceans North believes that the determination of the appropriate method for assessing the narwhal population estimate is important not only for the projects associated with shipping out of the northern route, but for any future developments of the Mary River Mine. The methods used to define the population trends here will influence the methods used for the Steensby operations and will therefore greatly influence the assessment of impacts to marine mammals and Inuit rights.

We strongly believe that 2004 should be used as a baseline for the Eclipse Sound narwhal population or population trends should be modelled using all available survey data. However, we want to reiterate that the determination of the health of the Eclipse Sound narwhal population, pre-Baffinland shipping, and how disturbance and population trends are understood, cannot be determined by a proponent and should lie with the regulators, based on the best available data from independent scientists and community experts.

Sincerely,

A handwritten signature in black ink, appearing to read "K. Westdal", is written on a light-colored rectangular background.

Kristin Westdal
Science Director
Oceans North

References

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cc. Marine Environment Working Group members