

APPENDIX C

2020 Working Group Meeting  
Records

## APPENDIX C.1

### MEWG Meeting Records

## Marine Environment Working Group (MEWG) Final Meeting Minutes

**Date:** February 25, 2020

9:00 am – 5:00 pm (EST)

Lord Elgin Hotel – 100 Elgin Street, Ottawa, ON

**Call in Number:** +1-416-814-2855 **Meeting ID:** 064701805

*\*\*\*Meeting agenda items were not completed as originally scheduled. A follow-up teleconference call was held on Thursday, March 5, 2-4pm (Eastern Time).\*\*\**

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Lou Kamermans (LK)	I	Parks Canada (Parks)	Allison Stoddart (AS)	I
	Emma Malcolm (EM)	I		Chantal Vis (CV)	I
				Jacquie Bastick (JB)	N
	Genevieve Morinville (GM)	I	Makivik	Gregor Gilbert (GG2)	N
Qikiqtani Inuit Association (QIA) and Consultants	Bruce Stewart (BS)	I	Mittimatalik Hunters and Trappers Organization (MHTO)	Phanuel Enooagak (PE)	I
	Jeff Higdon (JH)	I		Enookie Inuarak (EI)	I
	Jared Ottenhof (JO)	N		Amanda Hanson Main (AHM)	P
Fisheries and Oceans Canada (DFO)	Kim Howland (KH)	I		<b>Observer Organization</b>	<b>Participants</b>
	Marianne Marcoux (MM)	I			
	Alexandra Sorckoff (ASo)	I			
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG)	I	World Wildlife Fund – Canada (WWF)	Andrew Dumbrille (AD)	I
	Anne Wilson (AW)	I		Brandon Laforest (BL)	N
	Holly Hennon (HH)	I	Oceans North Canada (Oceans North)	Amanda Joynt (AJ)	I
Government of Nunavut (GN)	Brad Pirie (BP)	I	Nunavut Impact Review Board (NIRB)	Cory Barker (CB)	I
	Natalie O’Grady (NO)	I		Solomon Amuno (SA1)	N
	Stephen Atkinson (SA)	I	Canadian Northern Economic Development Agency (CANNOR)	Arusa Shafi (ASh)	I
	John Ringrose (JR)	N		Adrian Paradis	N
	Alexander Kelly (AK)	N			
			<b>Baffinland Consultants</b>	<b>Participants</b>	
			Golder	Patrick Abgrall (PA)	I
				Phil Rouget (PR)	I
			JASCO	Melanie Austin (MA)	I
			Environmental Dynamics Inc. (EDI)	Mike Settingington (MS)	I

**P**-phone in participation, **I** – In person, **N**- Not attending

**\*\*Meeting minutes updated to reflect comments received from Parks Canada and QIA\***

Discussion and Comments
<b>Baffinland Update</b>
<p><i>Baffinland (LK) welcomes all participants from member and observer organizations, and provides a safety share on incoming bad weather, slips, trips and fall and associated caution when traveling.</i></p> <p><i>LK also shares Baffinland's recent adoption of Inuit Societal Values into its corporate value system. Many of these apply specifically to the functions of the Working Group and should guide the meetings proceedings accordingly.</i></p> <p>LK: There is a full agenda to cover, so we will try to move through each topic and stay as much on track as possible. Once a summary of Baffinland's operations is discussed, the focus of the morning's discussion will be on the Early Warning Indicators and the Marine Environment Working Group (MEWG) Terms of Reference (ToR) in order to allow adequate time for suitable discussions.</p>
<p><i>Baffinland (LK) presents a summary of 2019 shipping season update, as described below.</i></p> <p><u>2019 Shipping Season Update:</u></p> <p>LK: Started shipping operations on July 17. To open the season, we assessed several criteria. One important component being communication with Mittimatalik Hunter and Trappers Organization (MHTO). Before we entered the Regional Study Area (RSA), we confirmed there was no one using the floe edge anymore. We also confirmed there was no longer any landfast ice along the entire shipping corridor and implemented transit restrictions based on ice conditions: 6/10 and above, only 1 transit in 24-hour period, 3/10 and above, 2 transits per 24 hours, 3/10 resumption of regular operations. Transits included a convoy escorts of up to 4 vessels. The MSV Botnica (the Botnica) was utilized similar to 2018 to provide assistance in heavier ice conditions. Marine Wildlife Observers (MWOs) were present on the Botnica and included Inuit MWOs from Pond Inlet both at the beginning and at the end of the shipping season.</p> <p>Loading of iron ore carriers commenced on July 19 and continued until October 30. A total of 82 vessel voyages were made. A total of 5.86 million tonnes were loaded and shipped in 2019. Operations resupply and infrastructure cargo vessels consisted of 9 freight vessels, 3 heavy sealifts, and 5 fuel tankers.</p> <p><u>Vessel Management Protocols/Mitigation Measures</u></p> <p>LK: A growing number of mitigation and management measures continue to be implemented as part of our shipping operations. These include:</p> <ul style="list-style-type: none"> <li>• Ongoing management of vessel speeds</li> <li>• Ongoing ballast water management</li> <li>• Routing in designated shipping corridor             <ul style="list-style-type: none"> <li>○ Minor deviations may occur during heavier ice conditions because vessel captains will always avoid ice to the fullest extent possible</li> </ul> </li> <li>• Start of shipping season criteria (MHTO communications, break up of land fast ice)</li> <li>• Communications protocol</li> <li>• Tracking of vessel speed compliance and routing through use of Automatic Identification System (AIS)</li> <li>• Hiring of Pond Inlet shipping monitors</li> <li>• Developed setback 40 km from the Nunavut Settlement Area to minimize spatial overlap with narwhal staging at the floe edge</li> <li>• Limiting number of vessels anchored at Ragged Island to 3 – drifting only occurred when safety considerations warranted.</li> <li>• End of season aerial clearance survey</li> </ul> <p><u>Summary of Project vessel compliance</u></p>

LK: Ore carriers were 99% compliant with Project restrictions for period covering July 17 to September 10, 2019. Percent of compliance for the entire shipping season will be reported on in the 2019 Annual Report to the Nunavut Impact Review Board (NIRB). Resupply vessels continue to have a lower compliance rate (i.e. closer to 90%), but overall demonstrated significant improvement to compliance with speed restrictions. This remains a continued area of improvement for our operations however we remain committed to improving our compliance rates. When comparing speed of Baffinland vessels to non-Project vessels, we are travelling at considerably slower speeds than other vessels in the area and to our knowledge no other operator in the area has implemented voluntary speed restriction limits.

#### Response to 2018-2019 NIRB Recommendations

LK: One of the recommendations of NIRB's review of the 2018-2019 Annual Report included showing dedicated efforts towards the selection of Early Warning Indicators (EWI) as part of marine mammal monitoring efforts. We have made sure to dedicate time this morning to allow ample opportunity for input from the Marine Environmental Working Group (MEWG). Data on numerous variables are being monitored as part of monitoring programs and the selection of a subset of variable(s) as EWI(s) requires meaningful participation of MEWG members. Between September 2018 and Spring 2019, limited feedback was received for advancing this process. As such, we are re-engaging the MEWG to support a path towards selection. We look forward to later discussions.

#### 2019 Monitoring Programs: Inuit Participation and Training

LK: We had an increase in 2019 Inuit participation through the hiring of numerous Inuit researchers in our monitoring programs. Signs of successful capacity building efforts included the annual return of staff to our teams and also vocalized buy-in support from participants captured through end of season feedback reviews. In 2019 we also had participants from Arctic Bay and Igloolik. Overall, we provided 710 hours of training and 6,500 hours of employment through the marine monitoring programs.

#### 2019 Monitoring Programs: Incorporation of Inuit Perspectives

We ensure that we engaged with the MHTO prior to the start of our monitoring programs. In 2019 we also hired Shipping Monitors based in Pond Inlet that provided the liaison between local residents and Baffinland. As part of our monitoring programs, we undertook post-program reviews with Inuit researchers to gather their perspectives on the program including what worked, what did not, and what their opinions were regarding observed Project-related effects.

#### 2019 Marine Monitoring Draft Report Release Schedule

LK: We are anticipating releasing a number of draft reports between March and end of April 2020. We will update the MEWG as we complete the drafts.

#### MEWG Terms of Reference (ToR)

EM: A number of proposed changes to the ToR were made based on initial changes initiated by the Government of Nunavut (GN) during summer 2019. As part of our Phase 2 Final Written Comment Responses package to the NIRB, Baffinland submitted a revised ToR. At a high level, we generally agreed with the proposed changes made by those who contributed to the review process. The changes that we proposed as suitable amendments provide a greater alignment towards a consensus-based approach for decision-making with clearer processes on how recommendations are identified, supported, communicated and tracked. As of Feb 10, 2020, no additional comments had been received as part of Phase 2 review processes. We would like to open the floor for discussion on this.

AS: Our understanding is that the GN had been facilitating a comment period during the summer, but not everybody in the MEWG had an opportunity to provide comments on that. We then received an updated ToR from Baffinland in October. I'm wondering if it's worthwhile to provide a "track changes" version from the original ToR. That way all organizations within the MEWG are able to comment understanding what modifications have been made. There are definitely a number of differences in the two versions. I'm wondering if that would be helpful to the group.

NO: I agree with you there is still a period required for review and comment. The GN has gone through the revisions provided by Baffinland on October 15 and has internally been working on updating with some additional revisions. If it's useful, what we can do is provide another version that can be read side by side because I do not think we will be

able to do a line by line review today. We could establish a timeline for when we would receive responses on the ToR.

SA: The initiative to revise the ToR and it was the GN that took the original lead in proposing changes to the ToR. The GN will continue to track a revised ToR and there is a new version that will be circulated to the MEWG members with an explanation of the key differences between what Baffinland submitted in October versus what we are recommending, which is the inclusions of an Executive Committee.

LK: The Working Group is an important component of what we are proposing for Phase 2.

AS: We would like to see the GN circulate a revised draft with a comment period.

KH: We would like to see a tracked changed version from GN. We need to talk to our legal team about what our formal recommendations could be.

AHM: For the MHTO, having prepared and reviewed our response to Final Written Submission I was not under the impression that we were supposed to review that, so we would need additional time to review and be able to provide meaningful comments.

SA: Are we are working under the assumption that this will be completed before Phase 2 hearings? One proposed timeline for this would be if the GN were to send out the latest version of the ToR, and then give people until the end of April to provide comments. People can provide feedback during the technical meetings, but you don't necessarily need to have written feedback ready at this point. If we do this, it would give us time to have a hearing before May (**ACTION**).

LK: We are consistently receiving comments on monitoring reports, the Production Increase Proposal (PIP) and/or Phase 2 from MEWG members that they want to have greater decision making in the MEWG. A lot of what we are proposing under Phase 2 requires that a MEWG is functioning in a way that provides people confidence for Phase 2, so we need comments before the hearing. My understanding right now is that the GN will release a draft to the group by the end of next week that reflects a collation of both Baffinland's October version and also their updates since. All parties will provide comments by first week of April and then it will be put to Baffinland to provide a final black line version. We have to take ownership on the ToR from that point forward.

#### \*\*\*ACTIONS\*\*\*

1. **GN** to distribute to MEWG members the latest draft of ToR submitted by Baffinland in October 2019 as part of PHASE 2 Final Written Responses package to the NIRB, along with their newest recommended changes, and all previous track changes made. Date of distribution to MEWG members proposed is by March 6, 2020.

#### Early Warning Indicators (EWIs)

##### Early Warning indicators (EWIs) – Conditions No. 110 and 112.

PA: There are two conditions that tie in directly with EWIs. Condition 110 and 112. Condition 110 indicates that the Proponent is expected to work with the MEWG to determine appropriate early warning indicators that will ensure rapid identification of negative impacts along the shipping routes. Condition 112 speaks towards monitoring protocols that will need to carefully consider the EWIs that will be best examined to ensure rapid identification of negative impacts. Thresholds will be developed to determine if negative impacts as a result of vessel noise are occurring. In response, mitigation and adaptive management practices shall be developed to restrict negative impacts as a result of vessel noise.

##### Early Warning indicators (EWIs) – Original Timeline and Current Timeline

PA: The original timeline based on when we started having discussions on the EWIs assumed that these could be developed by December 2018. The next proposed step was to monitor for early warning indicators in summer 2019. We have since had to revise the timeline for the development of these EWIs.

We we had an initial conversation in June 2018, a dedicated teleconference in September 2018, another meeting in December 2018. Since then, we have not had adequate time within the MEWG meetings to move this forward. A summary of all work that has been done with the MEWG was provided in response to the Board Recommendation.

This includes a copy of all correspondence that has been shared with the MEWG on this issue and is available on the NIRB public registry.

#### Indicator Requirements

PA: We have been exploring which parameters can be used as EWIs. To assist in this process, we set criteria for determining what would be an appropriate set of indicators. The key criteria are:

- Quantifiable
- Replicability
- Consistent site access
- Rapid post-data collection analysis / short lag time
- Technically defensible
- Long-term dataset
- Pre-shipping data
- Linked to shipping impacts

#### Proposed Indicators and Indicator Species

PA: During the prep work we met with the MHTO. One of the things MHTO noted was that there were some areas where they had seen changes occurring in marine mammals well before shipping associated with the Project began. For example, with body condition or marine mammal harvesting data, these changes are reported as having occurred for several years before the start of shipping, so it did not make a lot of sense to proceed with an indicator that could not be more directly correlated with Project effects.

When we were looking at what species would be more appropriate we evaluated both ringed seal and narwhal. After further review, we felt narwhal was most appropriate given the fact that there is the greatest potential for overlap with narwhal's sensitive periods (i.e., shoulder season shipping while narwhal are migrating in).

We also note that we are monitoring for several indicators through our monitoring programs. We have been communicating consistently that just because we have not established an EWI threshold, does not mean we are not tracking potential Project effects and/or other natural changes in the environment. For example, we are able to monitor population relative and absolute abundance estimates through visual and photographic aerial surveys, and through Bruce Head. We are also able to track additional information through specialized programs such as the narwhal tagging program, but we did not want to establish EWIs where the monitoring data could only be yielded by specialized programs given that we would not be able to complete yearly (i.e. limited access to dataset). We did discuss whether or not an increase in stress hormones was appropriate but it was screened out given the limited pre-shipping data set. Injury and mortality rate (i.e. through vessel strikes) are tracked through both the Ship-based Observer (SBO) and Bruce Head Shore-based (Bruce Head) programs. We also assess this through proxy review of Closest Point of Approach (CPA) data.

#### Calving Rates:

PA: If an animal is going to experience stress (e.g., limited resources) than that would likely be reflected in calving rate because they essentially make a decision between self-preservation and reproduction rates. A change in calving rate is therefore an appropriate EWI as a reduced reproductive rate would later be reflected in the overall population abundance. There is still difficulty in relying on the calving rate given that it is not easily directly correlated with Project effects, however, we feel it is an appropriate EWI for tracking whether or not changes are occur at a population-level which may be attributed to Project vessels. There is further investigation required to understand what other influencing factors (i.e., what occurs during overwintering periods etc.) that could affect calving rates, but ultimately this is the best indicator we feel could fit.

SA: One of the things that strikes me is that if you think about the phases of responses that animals will undergo the earliest response you will see is a behavioural response, that will then be followed by energetic changes, followed by changes in reproductive rates, followed by actual population level changes. With recruitment, body condition and population level changes you will have an extremely difficult time linking these to Project effects so I do not think

from a Project perspective that they fit. I would recommend you select avoidance indicators because you can directly link it to Project activities and it would be the first response. I also agree that narwhal would be an appropriate species.

SA: I also want to know whether or not you have considered using sea ice as an indicator you can check and see whether or not shipping is affecting sea ice as there is a long term historical dataset available. It would also give an indication whether there are changes to habitat occurring as a result of the Project.

CV: I echo the recommendations made by the GN because once you are already seeing population level changes you are already "in the red". Parks Canada is struggling with establishing quantitative thresholds because it is fairly difficult to determine so we are relying on expert opinions. I would also suggest that you open this up to a non-quantitative thresholds and rely on Inuit Qaujimajatuqangit (IQ) and expert opinions. The difficulty lies in the fact that it takes many years of baseline data before quantitative thresholds can be established (to account for factors such as natural variability and, increasingly, climate change). This is why PCA is suggesting that EWIs include indicators and thresholds based on expert opinion (western science and/or IQ or a combination of both).

El: For indicator requirements, I did not see any IQ written as what would be an appropriate indicator requirement. Inuit are natural observers for wildlife. Locally and seasonally we know where wildlife goes. Specifically, for narwhal we know where they go through specific times but we did not see any narwhal during fall time. So for example, that is something that could be considered as a change. Or in 2018 we did not see any narwhal, so I want IQ to be included in the indicator requirement. In the indicator species, you mentioned bowhead and narwhal? Specifically coming from Pond Inlet, we are observing less seals now too, so if that can be included too that would be good. As a health indicator, would there be lab testing conducting to assess this?

PE: In Pond Inlet, we hunt along that shipping route and I have worked out of Bruce Head. We have fewer marine life now since the start of shipping. We had plenty of ringed and bearded seal. We also have fewer fish at the lakes and rivers in the winter. In the summertime, there is a calving area, it is traditional knowledge that there are calving grounds along that route. When the ships are up there they will continue to ship even if it depletes all marine life. We see the difference in numbers already when it comes to bearded seal and fish.

AHM: I agree with comments from GN that avoidance would be more effective as a first response for EWI. I also want to make a note that this project was originally approved in 2014, so initial development of EWIs in 2018 is far behind the timeline. I also want to echo the sentiments of MHTO members that IQ should be considered. I think the inclusion of seal is really important because of their importance to hunters in the area. The other aspect that is important as an indicator would be looking at food sources for marine mammals. This would also be really critical for understanding if the population was going to be affected.

MM: I echo that this is a very challenging task, specifically if you need to link this to shipping. I echo SA's comments, but my worry is that the animals who do not avoid might even be more impacted. I wonder if you could comment more on why stress hormones and body condition have been put in a lower priority. Given that the Department of Fisheries and Oceans (DFO) has a very long historical data set on harvesting data, as well as body condition I believe this analysis could be done in a fairly quick analysis.

PA: Even if long term data set is available, Golder has heard feedback from some community members that there have been changes to the narwhal population before shipping started. So if there are changes it is difficult to know whether this is just something that is occurring anyways.

MM: I know we do have a long-term dataset that we could potentially share samples with. **(ACTION)**

PA: Well we would need to think about how long we go back into the baseline. To recap comments that have gone around the table, we did identify that avoidance behavior would occur as a result of the Project, so I suppose it is being proposed that we establish a threshold of what is considered a maximum allowable threshold for avoidance behaviour. As was seen in 2019 we have implemented changes to the monitoring program to further investigate 2018 numbers. We also noted that heavy ice conditions existed in 2018, was it killer whales, was it shipping-related; what factored in? So that is why the monitoring programs got increased in 2019. For some of the avoidance behavior indicator the tagging data has some insights that could assist us in fleshing out what an appropriate threshold may be, however we cannot commit to collecting this data every year.

SA: I feel that avoidance should be put on as a priority indicator. You could use aerial surveys for looking at avoidance behavior. As far as thresholds go, you cannot actually establish thresholds, and the relationship is not linear. I think a threshold should be defined as "at what point do you become concerned". As a biologist I would say anytime you can measure change, you should become concerned.



PA: I think that what we are trying to say is that we are responding to the “when should we become concerned about this” – we have clearly demonstrated responsiveness to this. I appreciate the comment made by MHTO saying that IQ should be included in the process. However, I do think this is something that is actually already being done. In terms of the inclusion of seals, there are not actually abundance estimates for the area, however not including them as an EWI does not mean that we do not think it is important. Maybe seal hunting has been more difficult to secure, but I guess the question to the group is if we are using narwhals as the indicator species, does the group not agree that this would be good representative of environmental health overall. With respect to using sea ice, we are sort of going two steps forward, one step back. The more we consider, now we are starting over again. AMH made a comment that we should have had these in place earlier but even in this discussion, you can see the challenges associated with actually moving this forward with the group. The participation is actually very limited.

SA: I think you should establish a quantified threshold but you should not necessarily look at this as a cause and effect indicator. I think what you need to do is gain agreement on what is an acceptable level of avoidance. Maybe look back at Final Environmental Impact Statement (FEIS) predictions. And then use the FEIS predictions around avoidance as your EWI. I think you should take a look at the sea ice indicator again especially given its importance to narwhals in particular.

GG: I agree that looking at sea ice would be effective. And I think this would be a cost effective because no fieldwork is required. You could also look at this as a measure for natural variation. Changes over the next 50 years, will have a strong downstream impact on marine mammals. It also supports what Inuit have been saying. Another efficiency I would like to see is a list of all the monitoring programs that are going on regionally. It seems like there is a lot happening that is not necessarily being efficiently coordinated. If well-coordinated, this could be one of the most well-monitored areas in the Arctic. I would also suggest you include ringed seal because ringed seal are more regional. Ringed seal ecology and narwhal ecology are so different, so you cannot just use narwhal to monitor for all other species. I see regional collaboration monitoring as an opportunity. One thing we do not do is hormone analysis on hunted birds, because the experience of being hunted elevates their stress hormones so much already. So I do not think it would be appropriate for narwhals either.

MM: I agree, you cannot use blood, but you could use blubber, because it actually captures a few months of stress.

PA: But then are you just monitoring for stress that was accumulated before they even intercepted any potential shipping-related effects associated with the Project.

MM: I wonder if you could just use noise as an indicator, instead of a biological response.

PA: I agree that is a good recommendation, and consistent with the specifics of the Project Certificate No. 005 Terms and Conditions (T&Cs).

JH: I was going to mention that the T&Cs are specific to vessel noise. QIA supports inclusion of ringed seal, and integration of IQ. You could use IQ to establish your historical dataset. It should be left to Inuit to determine what is acceptable and what is not.

CV: It seems like you have put in a lot of really good mitigations and it seems like it would make sense to connect these thresholds to the mitigations because you cannot look at them in isolation. It would also help us to see where you can make adjustments to better respond to changes / hitting thresholds.

#### Thresholds – Calving Rate

PA: So just before we break for lunch, I am going to review these slides to show what could be considered as a threshold for calving rate. This is some of the investigation that we have done based on previous feedback from the group that this should be determined based on statistical significance. This was a model we were looking at for assessing this. In aerial survey data this doesn't work as well because you would have to reach a critical threshold, and because natural variation can be very expansive.

JH: Are calves reported as proportion of total population or proportion of adult females?

JH: Is the 2019 numbers from Golder's survey or DFO?

PR: It is from one of five surveys conducted by Golder in 2019.

SA: For calving rate, have you considered using trends instead of statistical deviations? Because you might see a trend before you see the numbers actually drop to a point that you hit your threshold.

PA: We are going to move on from our discussion on the EWIs. The path forward will be that we will be summarizing what we heard here today. **(ACTION)**. Then we will ask for some additional feedback *in writing* from the group. **(ACTION)** We can then host a dedicated teleconference to discuss. **(ACTION)**.

**\*\*\*ACTIONS\*\*\***

2. **DFO** to review availability of long-term datasets (e.g. harvesting data, samples, body condition, etc.) that may help to support selection of adequate EWIs relevant to the Project and if available, share with MEWG members.
3. **Baffinland/Golder** will provide summary on “what we heard” during discussion with MEWG members on EWIs and will distribute back to MEWG members for feedback.
4. **MEWG** will provide feedback to Baffinland/Golder on summary document and other additional input for consideration on selection of suitable EWI(s). Feedback to consider existing datasets available to MEWG members for consideration to inform selection process of suitable EWI(s).
5. **Baffinland** will organize a dedicated teleconference call to further discuss the selection of suitable EWI(s) based on feedback provided in writing as part of Action #4.

## 2019 Marine Monitoring Programs

*PR (Golder) provides an overall high level summary of the various slides that will be presented on the monitoring programs that were run in 2019 including preliminary results when available, and how these meet the overall monitoring program objectives.*

PR: In 2019 we ran the Ship-Based Observer (SBO), Bruce Head Shore-Based Monitoring (BH), Marine Environmental Effects Monitoring Program (MEEMP) / Aquatic Invasive Species (AIS), the Aerial Survey Program, Passive Acoustic Monitoring (PAM) and completed analysis related to the 2017-2018 Narwhal Tagging Program. We had previously presented results from 2017 tagging program and are now ready to share info related to integrated data from those two years (2017 and 2018).

### Monitoring Objectives

PR: The key objectives are to measure effects of Project on marine environment, measure effectiveness of mitigation measures, and identify additional management measures as needed.

### Monitoring (Since 2015)

PR: A number of programs have been implemented since the start of shipping operations. Some programs have been run on an annual basis, while others are done on a more periodic basis.

### **Bruce Head Shore-based Monitoring Program:**

PR: Program has been running since 2014, with the exception of 2018.

### **Bruce Head Shore-based Monitoring Program - Project Conditions**

PR: There are a number of Project Certificate No. 005 Terms and Conditions that the Bruce Head Shore-based Monitoring program (Bruce Head) aims to satisfy. Meeting Project Condition (PC) 126 requires including Inuit in monitoring, with the ultimate goal of transitioning this to a community-based monitoring (CBM) program over time. PCs 99 and 101 are specific to running a shore-based monitoring program. 109 refers to developing a monitoring program that allows you to track behavioural responses of marine mammals. PCs 110, 111 and 112 also require the study of behavioural responses to ship noise. This is met by having a combined visual and acoustic study at Bruce Head.

### **Bruce Head Shore-based Monitoring Program- Camp Relocation**

PR: Camp relocation was necessary and undertaken in 2019 to address health and safety (H&S) considerations with having camp closer to observation platform, and also to maximize observation time. The observation platform remained in the same location to ensure consistency in program design with past years.

#### Bruce Head Shore-based Monitoring Program

PR: Typically the program runs over five weeks and include training sessions consisting of two rotations. Teams were composed of biologists, graduate students and Inuit researchers, as well as polar bear monitors. There were also drone team members and a camp manager.

#### Bruce Head Shore-based Monitoring Program

PR: New changes were implemented in 2019. Additional survey strata added more observations in Koluktoo Bay. Otherwise there is consistency in the strata across years previous. Additional strata were added because Koluktoo Bay is more of a holding area versus a travel corridor which is seen in front of Bruce Head. A pointer was also installed during deployment of Autonomous Multichannel Acoustic Recorders (AMARs) so that a behavioural study could be set up around that recorder which could be used to compare group composition passing over that recorder and the potential calls that would be unique to mother/calf pairs.

PR: A technical memo was submitted to the NIRB registry in October 2019 which summarized Relative Abundance Distribution (RAD) results comparing 2019 to past years. We have also worked up group composition data, so are now able to show calving rates. When you look at this data compared to results of the aerial surveys you will see similar trends.

#### Bruce Head Shore-based Monitoring Program - Drone Study

PR: The purpose of using the drone was to give us a sense of how accurate our observations were relative to photographic data in the far strata. We only had a week for the drone, so we focused on areas of the strata that were previously limited by glare, but also areas that were historically known to be highly populated. The tagging data showed us that more narwhals were using the area than we were picking up so we wanted to evaluate the accuracy of observations. We encountered a number of obstacles with the drone program: batteries, camera, radio link between UAV and radio station, wind. The camera is not effective enough to distinguish juveniles – or for fully identifying group composition.

#### Bruce Head Shore-based Monitoring Program - End of Season Interview

PR: In 2019 we implemented an Inuit perspective feedback and knowledge sharing session at the end of each program. So we've provided a summary of what Inuit researcher comments were on the BH program design, comments related to Project effects, comparison of behavioural response to other activities in the area (i.e., hunting activities). The intention is to broaden the analysis beyond that presented by Golder. These perspectives will all be provided in the Bruce Head report.

PA: In past years, earlier in the program, there seemed to be a greater response to ships than what we were seeing this year. We investigated this further and the discussion with Inuit suggested that response has been reduced over the number of years when shipping was occurring. This could be interpreted as a sign of habituation occurring in the area.

PE: I have to talk to you about my experience. From my own experience I have been at Bruce Head. I was there in the beginning. It was a good place to watch for narwhal and to see narwhal for hunting. It's our traditional hunting ground. When the ships started first coming, the narwhal would flee and then they would return after shipping returned. We do know that narwhal come back each year, but not in the same number that they used to. There are fewer narwhals and also the narwhals are very skinny since shipping started. So we know that shipping is affecting narwhal health.

JH: Have you looked at how the proportion of calves varies throughout the season? Is it possible to look at this using day-to-day data?

PR: The more detailed version of what we have been presenting here (i.e., related to group composition) will be included in the final technical report. This shows the variation across the entire season.

CV: In 2019 you had a reduced number of transits during icebreaking can you correlate BH data with this?

PR: No. The BH program only collects data during the open-water season. Bruce head is also one of the areas where ice breaks up earliest each year, so you wouldn't be able to effectively assess this. What we look at instead is the effect of simultaneous transits (i.e. one northbound, one southbound). However, the sample size is more limited because this does not happen as often. We also did this with the tagging data so that is the better dataset for understanding how narwhals would respond with greater amounts of noise.

MM: Perhaps more of a comment not a question. For BH, perhaps provide a measure of variance around your numbers of narwhal per hour and for calving rates as well.

PR: We can consider incorporating into report.

#### **Ship-based Observer (SBO) Program**

PA: Relevant T-Cs include 106, 123, and 126. There is also a requirement for monitoring for collisions (123 specifically). The SBO report will be provided to the MEWG in draft form in the near-term.

The total number of monitoring effort was around 250 hours for Leg 1. This is a non-systematic survey. It is opportunistic, based on where the ship must travel, so we are not able to conduct systematic density or abundance surveys, however it does provide some RAD data based on detection and level of effort and collects data on marine mammal behaviour. Killer whale and walrus were not recorded during Leg 1 in 2019. Each of the sightings are plotted to show where marine mammals are detected throughout the shipping corridor (*PA shows figure showing Leg 1 sightings*). Geographic distribution of marine mammals is generally consistent with what we saw in the aerial surveys as well. Most common seabird sighted in RSA in 2019 was the thick-billed murre. The full dataset of seabird sightings will be provided to Canadian Wildlife Service (CWS)-ECCC to supplement their database. We also review all data from the SBO program relative to ice concentrations in the area.

End of season aerial clearance survey results will also be reported on as part of the SBO program. The survey was run over a period of 2 days during the last day and the day following the end of shipping season. The intent of that survey was to scan the shipping route and then also survey areas that where historical entrapment events occurred. There were some narwhal footprints identified by the observers so we circled repetitively over that area to confirm, but we were never able to confirm.

#### **2019 Ship-based Observer Program – End of Season Interview**

AD: How does the review of monitoring data connect to the development of mitigation measures? We always hear the same results, but it is not helpful to improving the work of this group.

GG: I know for years we discussed getting the SBO program up and running and now we are seeing success with this. I am seeing the data for seabirds; we are seeing the same species in these monitoring programs, where they are, the timing of where they are. With this type of information being collected year over year, you are able to better understand what the trends are and how the Project may be affecting the environment. Especially with all the regional monitoring being undertaken, you are able to make more informed decisions in terms of management. This type of monitoring also allows researchers such as ECCC to be able to integrate these multiple sources of information and then know whether or not additional management measures need to be undertaken.

JH: Are ivory gull reporting single sighting or re-sighting?

PR: We can look into that and specify whether they were unique sightings or re-sightings.

ASH: Has there been any discussion about integrating all the monitoring programs so that information is readily available to one another, including incorporating IQ?

PR: In some cases, yes, there are requests for that kind of information to other parties, but this has not always been shared.

AMH: The original purpose of the SBO program was to just look at ship strikes. Is Baffinland trying to incorporate the information from this?

PR: The main point of the program as per the T&Cs is to monitor ship strikes. In reality, there are limitations to what you can do. You can record behavior, but in this case there is no reference because you are always in the zone of potential impact and therefore always potentially influencing behaviour. The only factor that you could look at is the relative change in abundance, and measure this in an equal pre- to post-shipping. That line of evidence will add on to the results of the other programs. But this program is the least effective in looking at behavioural responses near vessels and abundance. Aerial surveys provide information on abundance but doesn't allow for an examination

of behavioural response because of the spatial scale. With Bruce Head we are able to assess behaviour response more effectively. Bruce head provides a middle point between the two programs. It gives important information. You can look at the stock size in aerial survey, but may not see anything. But at Bruce head, if we are starting to not see narwhal or change in group composition, that would be concerning. We try to integrate program findings and slight difference is what we are trying to look at. For density estimates during SBO, that was specific to Eastern Canada Seabirds at Sea (ECSAS) protocol for seabirds.

AMH: I didn't see anything in the 20 slides on collisions.

PR: Even though the purpose is to monitor ship strike, we will collect tertiary information when we are on that survey. There were no recorded ship strikes in 2019.

GG: So back to AD's comment, as the information is building, I am trying to see where hot spots may be for concerns and link it up to the newest data collected during shipping. We are trying to integrate all of the data and then identify for the company (i.e., Baffinland) where the greatest risk to the species are to support management. ECCCs position is that we are taking the lead on regional research and trying to create mapping for industry clients, and establish a baseline so that the information is made available to support mitigation options. This could be done for narwhal as well. I agree with you on maps of what and when, but we need to first identify areas of risk. This is what we are doing next with the data that is acquired.

El: Just a comment. With respect to Phil's presentation slides 13 and 6, feedback from observers from SBO and Bruce Head. I am wondering whether you will make this more open for folks from Pond Inlet to comment on what has been observed and not just from employees.

EM: We agree this is a limited perspective being presented. We included this because we wanted to find another tool to integrate perspectives into our monitoring results and see whether there was alignment between the Golder results and the Inuit researchers that participated during the summer. Another objective was to try to ascertain a broader range of Inuit perspectives. We do hear various perspectives when we are in communities. So the intention was to get a broader range of perspectives including those of folks working in our programs and also see perspectives from community. Note that we do track comments that come through during the shipping season through our Shipping Monitors based in Pond Inlet.

#### **2019 Passive Acoustic Monitoring Program**

MA: During early shoulder season, two recorders were installed, shown at locations in this figure. One was located near Ragged island and the other is just south of Bylot Island. During the open-water season, the recorders were installed at three locations, as shown on slide. The one at Koluktoo Bay is about 6 km from shipping lane.

#### **2019 Acoustic Monitoring – Early Shoulder Season**

MA: Deployment was from 19-20 May 2019. The photo to the right shows the yellow cylinders. The grey cylinder is the actual acoustic unit. These sit on the bottom and stay silent on the bottom and just stay silent, except when they are released to return to the surface at retrieval. These were installed to measure sound levels of vessels, including icebreaker ideally during icebreaker. One of the waypoints is in front and behind ice breaker so that we can measure sound both as the ice breaker is approaching and leaving. Two of the AMARs were redeployed following their retrieval so that they can measure sound over another early shipping season with planned recovery in August 2020. They are timed to turn on again in July 2020 after they went "to sleep" on October 17.

#### **2019 Acoustic Monitoring – Early Shoulder Season**

*MA presents a series of results from the Bylot Island and Ragged Island AMARs that were installed to collect data during the early shoulder season. These figures will be presented as part of the passive acoustic monitoring reports.*

MA: The black line shows the full recording of frequency range. The green and yellow show narwhal frequency ranges of hearing. Measured sounds are from around 75 db to 135 db. Underwater reference (background sounds) are also shown. On the Ragged Island recorder (right upper panel), the blue lines are higher (lowest frequency sounds – wind or current noise). Interestingly, the data shows that naturally occurring sounds can also reach 120 to 135 db levels. The bottom panels show the recordings for when vessels were detected. Blue bars show all data and red only when vessels were detected. We see times when vessels are recording over 120 db, but we also see times

when natural variability exceeds 120 db. The highest level was Aug 3 when there were four Project vessels in the area (both Baffinland and non-Project vessels).

The table on this slide summarizes data consisting of exposure times of marine mammals to sound pressure levels (SPLs) greater than 120 db (disturbance threshold) whereas these next tables provide the comparison of modelled to measured daily noise exposure periods for disturbance (> 120 db). We looked at the icebreaker *MSV Botnica* transits where it was traveling directly over the AMAR units with escort of other vessels and travelling on their own. They came within less than 120 m from the units. From the five transits, we looked at the time over 120 db, and this was equivalent to 1.3 hours for escort of two carriers and a tug travelling at 9 knots in open water). To give you context of what we assumed in the modeling in the Phase 2 assessment, and to get to the degree of conservatism, we looked at the modeled versus measured, we looked at a 9 knot, 1 icebreaker and 2 ore carriers). For a narwhal sitting at one place as convoy moves past we had modeled 3.1 hours, but we actually measured 1.3 hours. That is for a single transit. Under a Phase 2 scenario, this means we could get up to 12.4 hours from modeled data, but in reality, it is 5.2 hours.

#### 2019 Acoustic Monitoring – Open-water Season

*MA presents a series of results from AMARs that were deployed from August 5 to August 28 to collect data during the open-water season. These figures will be presented as part of the acoustic monitoring reports.*

MA: A technical memo was submitted in February as part of Phase 2 submissions which provides more data. AMARs were deployed from August 5 to September 28. On slide with figures, we show AMAR-1 (deployed on shipping lane) and AMAR 2 (deployed in Koluktoo Bay). You see fewer large spikes, and the number of mean hourly SPLs lower at AMAR-2 (Koluktoo Bay) than at AMAR-1 (along shipping lane). You will note that ambient sounds (natural) over 120 db can be observed. We also calculate the mean and the maximum exposure at each location, as shown in this table. You can note the low percentage of total recording with SPL > 120 db for each AMAR, and as split by all data recordings versus vessel-specific data.

#### Acoustic Monitoring – Daily Noise Exposure Period Estimates (120 dB)

MA: We also show here a comparison of modeled versus measured data for Phase 2 open-water shipping scenarios for an “average” day of shipping. We assumed certain vessel types. From the Phase 2 modeling, we estimated exposure at 120 db for Post-Panamax and 2.2 for a Capesize carrier, if you multiple this by number of transits, this would be 11.4 hours (12.6 hours where animals are not exposed at >120 db or quiet time, ½ day is quiet, ½ day is <120 db). If we use the actual field measurements, a single Post-Panamax is 0.2 hour, and scale this up to capesize carrier and this scales a bit up to 1 hour. Resulting in 22.3 hours of quiet time based on measured data.

AJ: I have a question on the number of hours from the figures. Are those stacked?

MA: The red is in front of the blue lines.

AS: Quick clarification. So the AMARs that were out in the shipping lane at the time of potential icebreaking, but the actual recordings being shown are from open-water?

MA: The transects we received were from open-water conditions. The vessels did not want to go directly over where the AMARs had been deployed because of the thicker ice conditions.

AS: So the recorded sound during icebreaking would be higher.

MA: The time periods are recorded during icebreaker operation.

AS: You are showing modeled versus what you recorded. But your model is not accounting for icebreaking.

MA: We are showing modelled versus measured for various scenarios but in open-water conditions because this is the data that was measured.

CV: For early season, my understanding is that it’s the physical breaking of the ice or is it the noise that is causing the impact.

MA: During icebreaking you get louder sounds and it is not necessarily the icebreaking but the vessel working harder to move through the ice. This is the concern that we are trying to get at with this study.

HC: Is it the structure of the ice? A lot of the monitoring data presented is the average, are you measuring acute noise?

MA: Yes, we also characterize the acute. There are two mechanisms. Peak shipping noise will not cause hearing injury, otherwise it is the total dose of sound that can lead to temporary hearing loss or a long enough time (e.g.,



loud rock concert and you cannot hear for a bit after), or it could cause permanent damage if exposure is long enough. We do look at the upper boundaries.

MM: Can you explain the difference from the modeled to the measured?

MA: We looked at model validation in the 2018 report. There are a few assumptions that go into the modeling. The source data for vessel data was overestimating noise by at least 10 db. We also discovered that the water depth was not what we expected and thus the accuracy of the modelled bathymetry was not what we expected. Also, there were assumption made in the model about the bottom type of the seabed. Any of these or a combination of these, can lead to differences in modeling effects. Also, the longer range estimates can also affect the results. We erred on the very conservative side for assumptions.

AJ: What are the plans for 2020? Are there plans to verify the model in greater ice conditions. Can we get more information on depth and substrate? Will you be verifying the data from the noise modelling?

PR: We have to pick up the recorders that are currently deployed.

MA: We have two recorders that will be turning on again in July 2020 with the purpose of recording icebreaking sound during the early shoulder season for 2020. We will not be collecting depth or substrate data but the new data will refine the current data.

JH: For the measured Cape class, you did not actually measure any Capesize class?

MA: Yes, correct we do not have measurements of Capesize. We took a correction factor of 1.7 based on measurement of a Post-Panamax.

PE: My question. The big ships that you propose to start using, and into the inlets. It is shallow water on both sides. It will be very loud. It will be much louder than the ones you are measuring now under water because there is shallow water that you have to take into consideration, and how much louder do you think they will be than the ones you are using now?

MA: I think you indicated that the ships will be louder than where we measured, and that the vessels will be louder than those being modelled. The model does account for different depths within the water body. Also the recorders from 2019 are in different depths, including in Koluktoo Bay ~ 120 m, and others are in deeper waters.

PE: They will be very loud. How are you planning to monitor the marine life? We live on the marine life from those waters. If you drive them away, and we feed our dogs with the wildlife we catch on the waters. We will not be able to keep our dogs and have to give up our dogs. We will have to give up our traditional lives to keep up with our life.

EM: We are implementing different programs. We look at different aspects of the environment to see if there are changes. We are presenting you all of the various tools that we are using to investigate whether animals are reacting and or are leaving the area when Project vessels are around. When we speak about the acoustics, we are looking at how much noise marine mammals are experiencing when vessels transit in the area. By doing the modeling, we are able to better quantify how noise may be influencing marine wildlife. This is a good segway into moving into other marine programs and provide comparison to baseline conditions.

### **2019 Marine Mammal Aerial Survey Program**

#### **Marine Mammal Aerial Survey Program**

PR: We completed two legs as part of the 2019 aerial survey program. The purpose of each survey differed. For Leg 1 the objective was to complete early staging surveys to better understand where marine mammals were and how they interacted with ice conditions and vessels generally. The second leg was specific to generating abundance estimates for the Eclipse Sound and Admiralty Inlet stocks. Survey teams were based in both Pond Inlet and Arctic Bay. The crews consisted of Golder MWOs, Inuit MWOs and a Golder data recorder. The aerial surveys took place using twin otters. Decision on when to switch from visual to photographic was made when there were too many animals to count visually. Once photographic surveys are initiated decision the aircraft increases to higher elevation. Then the pictures are stitched together in a combined density estimate. The overall goal is to look at how overall population stock has changed over time, for both stock areas. We are currently in the process of analyzing data.

#### **Marine Mammal Aerial Survey Program - Eclipse Sound and Admiralty Inlet**

PR: The specific grid-based survey was only done during Leg 2 abundance surveys. The selected survey design shown on this slide was shared with DFO prior to the surveys being implemented, and this is where we landed after multiple iterations.

#### Marine Mammal Aerial Survey Program - 12-13 July (Leg 1)

*PR goes through the figure and presents details on the various grid lines that were flown.*

PR: At the start of the survey ice conditions were such that narwhal could have entered the system. First surveys were strictly reconnaissance surveys to see how far westbound the animals had reached. Upon determining how much ice break up had occurred, we started running full transect surveys towards the end of Leg 1.

#### Marine Mammal Aerial Survey Program - 21-23 July (Leg 1)

*PR goes through the figure and presents details on the various grid lines that were flown.*

PR: Vessels had come in by this date. You can see the track. We recorded no narwhal at Baffin Bay floe edge, and then moved over towards the west. You can see that we had some photographic captures.

#### Marine Mammal Aerial Survey Program – 2019 Results

PR: We're still looking at Admiralty Inlet results and actively going through the Eclipse Sound. We observed bowhead whale and killer whale sightings in Navy Board and Milne Inlet. We saw them at the entrance of Baffin Bay as early as July 23.

#### Marine Mammal Aerial Survey Program – Digital Photography

PR: Digital photography occurs at 2,000 ft altitude. This occurred at Navy Board Inlet when we were getting very high densities of narwhal along the shore.

#### Marine Mammal Aerial Survey Program - 25-26 Aug (Leg 2)

PR: We will be using the data with the most precise coefficient of variation (CV). Photographic datasets are preferable as they provide the most accurate estimates. In August, most narwhal were concentrated in Koluktoo, Milne Inlet, and this is where all data was mostly based on photographic. The tech memo includes the data from this specific period.

#### Marine Mammal Aerial Survey Program - Annual Comparisons

PR: The lowest row shown on this table has the best data. We are now dealing with a CV of 0.07. This is essentially an index of how much precision you can get. The goal is to get the lowest CV. This is why we run 5 or 6 surveys in a summer to maximize opportunity to get the best estimate. The photographs give you an absolute count from an area versus the difficulty of the bubble window. Bubble window visuals have wider track lines, and you are assuming animals are evenly distributed even though this may not be the case. Fortunately, the chance of getting photographic surveys in Eclipse Sound are increased when animals are more concentrated. We will be presenting all of the data in the report for both Admiralty Inlet and Eclipse Sound.

*PR opens up the floor for questions.*

SA: Going back to original T&Cs and the requirement to run periodic aerial surveys. What is the frequency? There was a discussion of using abundance surveys and whether you plan on doing power analyses. I have worked on these types of abundance surveys and with the range of CVs, you may be able to detect trends before you detect meaningful changes in abundance. You were suggesting this morning of looking at abundance estimates as an EWI, that you would use standard deviation (SD) estimates and would look for a decline that is almost at 60%. Are you planning on doing power analyses?

PR: Yes, we will be including a power analysis in the report.

CV: To look at abundance through time, in the statistical analysis, you have to start looking at whether there were relations to ice conditions, shipping, etc. There are all of these confounding effects that may influence results.

PR: We are only looking at open-water season when completing abundance estimates. The early Leg 1 was just to get a feeling for what was happening at the floe edge, but the floe edge was already degraded. The first leg was more about answering whether the animals had entered the system, is there a floe edge, where are they hanging out? When we are looking at the stock population, we are doing the survey during open water conditions. The number of transits is therefore irrelevant. If shipping is going to have an overall negative effect, we would assume that the numbers would drop with increase in shipping. If you are seeing an increase in shipping and then you see higher estimates, then shipping is not having an effect.



AS: If we go back to EWIs and setting thresholds. Two SDs were shown for abundance. How did Baffinland come up with this? Was this discussed with Inuit communities?

PR: The 2 SDs were based on blending and when a trigger could be set. At one point, we need to move further from 50% to 10% change in population levels because 10% change in abundance is nearly impossible to measure. When we present the power analysis in the report we will provide more information. I would not put too much emphasis on what PA presented on the 2 SD. It is an example of where we could go if we were to set something for an EWI and associated threshold.

MM: I understand that you will be giving us a report. These are oblique photos. How did you stitch them together and figure out duplicates? And how did you deal with the detection function? And also how do you measure your reader repeatability? Your measure of your confidence in your reader and increase your CV. We will need to see the calculation for your CV. **(ACTION)**

PR: A lot of those responses are provided in the Baffinland technical memo that was recently submitted as part of Phase 2. We did include information on detection function. It is also a blended approach similar to DFO's approach.

AD: The technical memo submitted as part of Phase 2 does not appear to be posted on the NIRB registry.

EM: The technical memo is an appendix to our Phase 2 submission package to the NIRB. The full technical report will be available for review by MEWG members sometime in April.

SA: Are your photos being taken oblique?

PR: No, they are not oblique photos.

SA: Photographic surveys will have lower CV in comparison to visual surveys. You could have all 10,000 photos be reviewed by local Pond Inlet-based Inuit researchers.

PR: The August 25 survey is pretty much a full photographic survey because on that specific day, narwhal were concentrated in specific areas. The challenge is if you are running tight surveys, it would take too long to run through total area and you risk having whales move through various strata. That is why we run parallel surveys from Arctic Bay and Eclipse Sound.

### **2017-2018 Integrated Narwhal Tagging Report**

PR: The objective was to look at narwhal response to vessel traffic using tagged narwhal. The dataset is based on 20 animals tagged in 2017, and four in 2018. This was a collaboration with DFO and was a DFO-led tagging program and added onto their ecosystem-based Tremblay Sound program. Various components were measured. Different tags were used, and each type allows to support various objectives. Not all tags deployed provided sufficient data resolution. We basically take the data from all tags, and then combine that with ship track lines. And we look at any interaction events (within 3 km) based on tag and vessel track data.

*PR describes V-shaped dives.*

PR: How long did those v-shaped dives last? We ask the same question. We look at both before the vessels pass through, and after the vessels, so before exposure and non-exposure and what it was doing, (e.g., foraging event versus other events).

*PR explains the various series of figures being shown, including observations of behavior and noise, and distance considerations from vessels.*

PR: Multiple response variables were investigated. For example, surface time, dive rate, etc. We teased apart surface time (above 7 m from surface – surface) dive, greater than 7 m. We looked at bottom dives, time of depth (e.g., time of time spent at bottom, per dive depth). We also looked at turning angles (e.g., is it avoiding vessel).

PR: A number of sub-surface (dive) and surface movements were analyzed using a number of parameters defining dive response. There were a number of non-statistically significant findings for dive Rate, time at depth (deepest 20% of dive, not bottom dives) and descent speed and no differences between exposure versus non-exposure events.

PR: There were some parameters that define dive response that were found to be statistically significant for vessel events in comparison to no vessel events. Specifics are summarized in this slide and will be described in detail in the integrated tagging report. These included:

Surface time: close distances only, with surface time decreasing when within 1 km from a vessel.

Dive Duration: At 1 km, dive duration decreased. If we convert that to a time period. At a vessel traveling at 9 knots (17 km/hour) a response zone is 2 km (approaching and departing), this would translate to a 7-mins exposure period). You would expect this response for those 7 mins.

Performance bottom dives: Narwhal that are already exhibiting feeding behaviours prior to vessel event differs significantly (statistically) from those not already engaged in feeding. This is equivalent to a 10 km response period, a 30 min change for a vessel traveling at 9 knot. There were also a number of parameters describing surface movements that were statistically significantly between vessel events and non-vessel events. These included turning angle (angles higher when within 4 km of a vessel) and Travel Orientation. For the latter, within 5 km of a ship approaching, and still apparent for 10 km during departure. Animals presented significant differences in response for this variable. You're not mirroring the distance, you are adding the 5 km and 10 km (15 km total), so response period is just below 1 hour.

PR: In summary, close vessel traffic events with narwhal resulted in a decreased surface time and dive durations, and for distances between 4-10 km, some changes were observed that were tied to whether individuals were feeding prior to event, and they typically oriented themselves away from vessels.

PR: As expected, and consistent with the predictions of the FEIS, temporary effects were observed. Results support a temporary, localized avoidance but no long-term abandonment of area. All of this data is being pulled together into a technical report. It is an updated report with newest analyses, based on input provided by the MEWG last year.

*PR opens up the floor for questions by MEWG meeting attendees.*

BS: How might the use of modelled rather than measured noise levels have affected analysis of the narwhals behavioural reactions?

PR: Using measured data would shrink the exposure distances, so they would be conservative. Might be useful to look at the data to determine the real ranges. We don't think sound is the only thing whales are necessarily responding to (e.g., visual cues as well).

AI: It would be helpful to have a comparison of data with the effects predictions. If it is having a localized effect, how do those localized effects would support the cumulative effects. This is leading me to believe that there could be a cumulative effect, so how has this been carried forward in the assessment?

SA: When you say no long-term abandonment. You cannot conclude this on this short-term dataset. Second point. I have not seen the details of the analysis. Based on what I heard, you have limited your findings to within 10 km, versus greater than 10 km away.

PR: These are two separate questions. The first to abandonment. It is referring to the tagged animals only. And their seasonal abandonment of where we know is their hot spot. Where we know narwhal like to hang out, we know where the animal is and where it hung out. The second piece. We felt confident with the acoustic modeling where beyond 10 km there was no exposure. The behaviours were not going to be influenced by non-AIS vessel activity. The upper levels of the 8-10 km, you may have exposure from non-AIS vessels. How confident are we that 10 km is the farthest? Based at the time, we felt that this was the right number, and it was a balance of sample sizes.

GG: This is a world class dataset. This could be multiple theses.

PR: We have dealt with it in support of the Environmental Impact Statement (EIS) Addendum. This is with DFO and they could start looking at it in different ways.

MM: We plan on doing more with this data.

SA: It is a small dataset. But do you have daily exposure period based on the daily vessel, and individual movement.

El: Any vocal changes behaviour?

PR: That is a tricky thing and we are trying to address. When you are not hearing a narwhal, does it mean it left the area, or it is focusing its head away from the recorder, or it is masked and you cannot hear it from vessel masking. For example, with calling rate changes, if you are getting lower rate, it may just be that the animal turned away, or it simply stopped calling. The Acousonde™ are a great idea, but the recorders are on the back of animals while the animal is traveling, they do not work well when they are on the back on the animal and when they are vocalizing from the head. And then also they are stressed because you just captured them to install them. Essentially you are getting a good idea of when the animal is stressed.

*Meeting is adjourned at 5pm. It was decided by all attendees that the remaining agenda item (2019 Physical Oceanography and Marine Environmental Effects Monitoring Program (MEEMP)) would be discussed during a scheduled teleconference the following week. (ACTION)*

**\*\*\*ACTIONS\*\*\***

6. **Golder/Baffinland** to provide as part of the 2019 Marine Mammal Aerial Survey Program report the calculations associated with the coefficients of variation for abundance estimates and also confirm with DFO the level of detail that DFO would like to see as part of calculations.
7. **Baffinland** to schedule a teleconference for week of March 2, 2020, to resume discussion of outstanding agenda items (i.e., 2019 Physical Oceanography and 2019 MEEMP).

***Continuation of agenda items resumed during a teleconference call held on Thursday, March 5 from 2-4pm (EST).***

*Attendees included the following:*

*Baffinland: Emma Malcolm (EM), Genevieve Morinville (GM), Lou Kamermans (LK)*

*Golder: Christine Bylenga (CB), Phil Rouget (PR), Phil Osborne (PO), Patrick Abgrall (PA), Julia Horgan (PH)*

*GN: Brad Pirie (BP)*

*DFO: Alexandra Sorckoff (ASo), Kim Howland (KH), Marianne Marcoux (MM)*

*MHTO: Amanda Hanson-Main (AMH)*

*QIA: Bruce Stewart (BS)*

*Oceans North: Amanda Joynt (AJ)*

*ECCC: Anne Wilson (AW)*

*CANNOR: no attendees*

*NIRB: no attendees*

**2019 Physical Oceanography**

PR: We will walk through the slides that are specific to Physical Oceanography because PO will be available only for questions at the beginning of this call. There are numerous T&Cs associated with physical oceanographic monitoring components. These include water column properties for both salinity and temperature, and we also have a tidal station at Milne Port to monitor tidal levels and storm surges. Bruce Head mooring location changed slightly westward near Poirier island from 2019. The purpose of that was to collect data on the center part of the channel where there was a better defined slope so that there was fewer interference from the islands. This was basically just to get it into an area with better defined flow conditions through the area. Moorings were deployed on August 6 and the data is currently being processed. This will be included in the MEEMP/ Aquatic Invasive Species report.

PO: One of the other components this year is that we were asked to look at what dynamics were influencing sediment transport near Phillips Creek to address a NIRB Board Recommendation on this from their 2017-2018 Annual Report. So the approach we took was to look at historical dynamics and historical data of the creek mouth morphology which included morphological conditions through aerial photography analysis. The area is a creek delta, so there is a quite a large and extensive delta from sediments delivered mostly during freshet conditions and snow melt, and precipitation events. It is a very dynamic area that has formed and is influenced by freshet events quite significantly. The delta is also being modified by waves so that contributes to a considerable amount of dynamics in that area. Historically the delta has been reworked by natural geomorphic processes including sediment deposition, migration and avulsion of Phillip's Creek and the westward extension of a coastal spit on its eastern side. This information has been documented in more detail in a memo summarizing the discharge regime of the area. The study will be included as an appendix within the MEEMP/ Aquatic Invasive Species report.

PR: Do we have any questions for physical oceanography? Otherwise I will refer back to MEEMP (slide 71).

AJ: Looking at slide 88 and particularly with respect to T&C 83a, how does that link to the DFO authorization conditions and how does this program meet the conditions.

PR: These are basically handled through the NIRB Project Certificate. DFO Authorization is really only for construction and maintenance of the ore dock. There is a T&C as part of the Environmental Effects Monitoring (EEM) that has a sediment sampling design that is gauged to test the impact predictions made in the EA and against the modelling. That is also what Phil was referring to with the Phillips Creek memo; when we observed a greater number of sediment fines, we wanted to further investigate.

BS: Are any field studies planned on the actual specific field sampling of sediment accumulation? Will further work be done around the Phillips creek sediment sampling in 2020?

PR: We are not there yet in terms of what we may plan for. We are going to look at 2019 data, once we have that data in hand and we are able to look at the results of the Phillips Creek study, we will determine if that is a recommendation we put forward to BIM.

#### **MEEMP Program**

PR: There are several T&Cs that have informed the design of the MEEMP. There were several drivers of the program, and these include the potential for sediment redistribution, potential effects associated with ballast water, etc. The MEEMP was originally designed by previous consultant, SEM and the original frequency had studies being conducted on a tri-annual basis, however we have continued to sample on an annual basis. I wanted to mention this because of the fact that the frequency for running these programs have come up several times in the past meetings.

PR: As you are aware we changed the sampling design program, particularly on the benthic and sediment side, which could have been completed in 2019 if the research vessel had been available on time, but we were not able to complete fully without this vessel. The intention is to use this vessel in 2020 to run the full program.

PR: Field program ran from 24 July to 6 October. We had an incident in the small field vessel so the program was put on hold for several weeks and then that program resumed in the start of September. As mentioned previously we've just received the last of our taxonomic results from the lab and chemical results, but these results are still being worked up. For water quality sampling, this was done at a level of effort consistent with past years. 6 times over a 6-week period. We did a number of CTD profiles, both in the Port and at BH. CTD profiles provides information on temperature, salinity and PH. We also had depth vertical profiles conducted.

#### **Marine Sediment Quality and Benthic Infauna**

PR: We had a change in sampling design that was introduced last year as a result of the MEEMP Power analysis, identifying that we needed to increase the number of sampling stations to get to the number of samples to discriminate Project effects. We were trying to achieve 15 sampling stations per transect, we were able to achieve 10. This was because of the lack of research vessel. We intended 74, but we were only able to sample 32 sediment stations. We used a combination of Ponar and Van Veen sampling. Because the Van Veen sampler has a larger grab, the sample was split. Samples for sediment chemistry were sent for polychlorinated biphenyls (PCBs), inorganic carbon, etc.

#### **Remotely Operated Vehicle (ROV) Program**

PR: We introduced rectangular belt transect plots in 2018. We previously conducted epifauna surveys using video along transects that were not marked, so we revised this to have a semi-permanent belt transects installed, both in reference and monitored areas (five in each area). Feedback from MEWG indicated that we should consider belt transects in reference and monitored areas. Those sites were resampled in 2019, three of which had been moved from the ice. Where these are installed, it seems like the ice drags the belt transect into a new location. So unfortunately we were not able to sample these because the belts were no longer there. We could possibly move into deeper water, but then you get away from the productive area. We know that the most productive area is the 10-15 m contour area, so if we move to deeper water to deal with ice effect, we would lose the productive area to sample. Otherwise, we may want to use something else than does not get moved by ice, so we would like feedback on MEWG on whether or not we change approach or location.

PR: Our Aquatic Invasive Species program is multi-trophic. We have dedicated transect lines that radiate out from the ore dock, which are reserved for species ID as part of the Aquatic Invasive Species program. We also added a new site in 2019 near the floating freight dock which was installed in 2019. Another transect had to be moved because there was a grounded iceberg that was sitting on top of the previous transect.

#### MEEMP - Marine Fish

PR: The program covers a mixture of different sampling methods, using both trawling and jigging, gill netting, fukui traps and fyke nets, which we're exploring as an alternative to the fukui traps because in past year we did not have great results on Catch Per Unit Effort (CPUE). We did change location of some of the fukui traps, and added weights on to the nets based on advice from BS from QIA (a follow-up action from previous June 2019 MEWG meeting). There were a total of 279 fish captures in 2019; including sculpin and Arctic char. A total of 47 Arctic char and 30 slimy sculpin were retained for body burden analysis. Results have just come in and we are working on that. We also collected *Hiatella arctica* which was sent for aging and tissue analysis.

#### Aquatic Invasive Species Program

PR: The main focus areas for the Aquatic Invasive Species program is in Assumption Harbour where most of the anchorage occurs, and where loading occurs. We also run Aquatic Invasive Species monitoring at Ragged Island, which is where vessels are holding when anchorages are full at Milne Port. In 2019, our intention was to incorporate otter trawls and beam trawls, but this could not be completed because the research vessel did not come in. We also got an improved ROV for 2019, so the resolution is much better for species identification. A remaining challenge however is the amount of plankton in the water, making it difficult to see with the ROV.

#### MEEMP – End of Season Interview

PR: Suggestions from participants varied from H&S related to comments related to see reduced fish handling times and they also recommended that they should dissect in the field, remove the otoliths, stomachs, so that the rest of the fish can be provided to the community country foods kitchen. Participants also made suggestions to improve accessibility of the MEEMP program data.

#### 2019 Marine Fish Habitat Offset Monitoring Program

PR: Year 5 is completed. Those results were provided to DFO at the end of December. Year 5 was focused on structural integrity of the ore dock. Main findings were that the offset habitat was stable; no slumping or failure of the structure. Every year that we've been monitoring we've seen continued growth of algae year-over-year and noted an increase in the number of fish utilizing the habitat. Several species were shown to be using the habitat, including both sculpin species, cod, pricklyback. We also saw an increase in encrusting epifauna abundance and diversity based on settlement plate basket retrieval. Overall habitat appears to be functioning as intended.

*PR opens up the floor for questions from MEWG members.*

BS: For Slide 79, you have noted 8 benthic, 10 sediment sampling sites: why is it not the same numbers and why didn't you just run them in parallel?

PR: Basically we were running out of time at the end of the season. We were moving into end of September and into October. The sediment grabs are not a composite; they are a unique grab. We were able to do the unique composite grabs and we were basically trying to work our ways out at the deeper sections. The deeper you went, the more challenging it was with the Ponar. It was very challenging to get appropriate grabs. The further we went out we had to rely on the Van Veen. My understanding from the field crews is that they were still done on the same days, but they were unable to get full composite grabs, and made a decision to at least get single chemistry grabs.

BS: Do you really think you will be able to meet the full sampling design for 2020?

PR: Yes. The new boat has an A-frame with a powerful davit system. We designed the vessel in that way so we can accomplish the full sediment programs. The new boat will have a much better sediment sampling apparatus. It should take about 4 weeks. The speed of recovery, working space. These smaller vessels are quite awkward to work on. We had to build a davit system for the smaller boat. The mining engineering team modified a small crane system from a rescue vehicle. We fabricated a boom system. We were still needing the right clearance. There wasn't a tuna door so had to haul over the top. We did what we could given the circumstance. It's a lot of samples at 78 stations. We will need to split samples, which is fine and standard approach with the Van Veen. If the grab success is not as good, we will be able to add lead plates too it if we need more weight.

KH: Do you do any sieving in the field for your sediment samples?

PR: Yes this is done in the field.

KH: And you're still ending up with a large volume? We typically don't to do subsamples for Van Veen.

CB: Yes. 12 L of sample jars after processing.

KH: Ok, we should talk about the methods then, because we have never gotten that volume. Perhaps the methods for doing this could be modified. Sieving at the large end and small end would help.

PR: Yes, we can talk about that. It is a lot of work, and it is very costly to send all that back to the labs. **(ACTION)**

BS: I was curious about the ninespine stickleback and whether or not you sent that specimen to the museum?

CB: I believe these were caught in our seine nets which would have been right off the west side of the ore dock. We did look into Aquatic Invasive Species data. The finding is consistent with historical records of what is present in our area.

BS: It would be useful saving the sample because it is not frequently there. I was surprised to see this.

CB: These were caught in seine nets.

BS: That's great. Done for the moment.

KH: You mentioned adding in new sites to the transects, I am having trouble seeing what you added. Are the new ones added to the end of existing transects or denser sampling within the transects?

PR: That's a good question. They were intermixed, so they were tighter.

KH: That is good for increasing your power, because otherwise you would have more variability as you move away. This is what I would have suggested. I could not tell from the map.

PR: The blue is showing where we did not get to sample, the yellow is showing how far we got with sediment, benthic, etc. In the report, I can include additional figure of what was done in 2019 versus earlier year **(ACTION)**.

AW: Were you able to get the original 5 sites?

PR: Yes. I will include a figure in the report, clearly distinguishing new and historical sites.

AW: Will you be doing a power analysis on the five sites to see these newest results?

PR: Yes, this will be included in report. **(ACTION)**

KH: Why did you not use Van Veen in shallower sites?

PR: Depth difference. The Ponar sampler was more convenient with the Davit system. Ultimately it was just a decision in the field.

KH: So going forward the plan is to use Van Veen at all sites?

PR: Yes.

KH: I would recommend doing parallel sampling with Van Veen and Ponar grabs at a few sites to compare if results are the same. The Ponar may not dig down deep enough compare to the Van Veen. They may not be comparable; you may not get the same species. You may pick up different things. You may want to start checking that and see if the older results are comparable to the newer results because the way you are sampling may affect the results of each grab. That way you could confirm how comparable your new results are to.

KH: What is difference between Aquatic Invasive Species transects and regular transects?

PR: One is just species identification using underwater video, and then the belt transect is quantification of epi and infaunal, separate components of the MEEMP versus AIS. Everything gets identified into AIS. But in addition, we have aquatic invasive species-specific transects for presence/absence. One is essentially just a detection program, we're not quantifying.

KH: So I assume any samples you are taking are still being sent for sampling?

PR: Yes.

KH: I have said this before but I do not think the ROV sampling will get you the resolution that you need to identify the species that may be of concern and for non-indigenous species (NIS). I guess it will help to know you can do additional sampling. I don't know if there is any way of doing another type of sampling along those transects.

PR: I agree it is probably the least powerful sampling approach, however it has been a traditional component of the program since Golder took over the work. When we removed the Environmental Effects Monitoring (EEM) video transects, we did not remove the Aquatic Invasive Species transects.

KH: Can you describe details on number of hours /effort for different sampling methods for fish? How is effort distributed? Do you sample throughout the season? How often are you going out and are you going back out to the same location?

PR: We try to even it out over the season and depends on the fishing technique, and shoreline topography. In terms of gillnetting, after 4 years of gillnetting, we know where we can go and have successful catch rates and those areas



are resampled. We do try and put a lot of effort in the front end of the season when Arctic char, are present. They typically leave by end of August. It is a hard question to answer for this year because we were basically working to recover from a loss of time in the schedule. What we will try to do moving forward is focus in on regular sampling throughout the season.

KH: I recognize that this year was odd. Important to know that it is over the season. That is good to hear.

KH: I am not remembering what you are doing with all samples. Are you interested in demographic changes or just tissue contaminants?

PR: We are interested in both.

KH: I think the sample size is low for doing a demographic assessment. Although you could look at overall range of ages to determine if your sample size is appropriate.

PR: The permit issued to us by DFO is only a maximum of 100 Arctic Char.

CB: We are not allowed to kill, just incidental mortalities.

KH: You could use fin clips for Arctic char if you can only take live samples. You can check the literature on aging comparisons.

PR: If we could put Ross at DFO in touch with Christine, that would be great. **(ACTION)**

KH: You said the ROV had improved camera resolution, by how much? Are you actually noticing a difference in the number of species you can identify?

PR: I do not have numbers yet, but that is the feedback we received from the operator. There is still a limited species identification. We looked at installing mechanical arms on the ROV, but it is not possible without getting into ship-based ROV systems. We can re-evaluate once we get all the results.

KH: Even for EEM ROV sampling, it would be good to do some sampling so you can compare video results from sampling. It may be good to do some concurrent real time sampling to see what you're missing from ROV.

KH: Are the tows being done only at one time for zooplankton and tows?

PR: Yes. We were only able to do once at Ragged Island, but typically we try and do it twice. At Milne Port sampling was done evenly throughout summer.

KH: So what is the frequency?

PR: We can include a table in the report that shows the schedule. **(ACTION)**

KH: I was curious about the Inuit researcher knowledge shares regarding the benthic infauna sample? I was wondering whether there was knowledge that the Inuit wanted to know. Do you do in-field benthic identification?

CB: Yes.

*No additional questions from MEWG participants.*

#### \*\*\*ACTIONS\*\*\*

9. **Golder/Baffinland** to further discuss with **DFO** (Kim Howland) sampling methods/processes related to benthic grabs
10. **Golder/Baffinland** to include power analysis results using the newly added sampling sites and will clearly indicate in report figures new and historical sites.
11. **DFO (KH)** to connect Golder with DFO Arctic Char aging specialist.
12. **Golder/Baffinland** to include a sampling frequency (field schedule) as part of 2019 reporting.
13. **MEWG** members to provide comments on past draft meeting minutes distributed by Baffinland on by March 13, 2020.

#### Next Steps

EM: Thanks everyone. I am going to wrap up our call here. A couple of notes. PR and PO will be aiming to get drafts out on MEEMP/AIS report by early April based on current schedule. It is a bit delayed because of timing for samples being processed as a result of later field season. I want to make a note that the DFO Habitat Offset Report was sent

out when the last set of minutes (June and October 2019) were distributed for comment. We also are waiting on comments from the meeting minutes before finalizing. Please send them in to EM by March 13, 2020. **(ACTION)** For anyone that is newer in participating in these meetings, we will be focusing our next meeting on upcoming 2020 programs. This will likely be in the spring but our timelines are a bit more tentative.

KH: I was just wondering about the location for the next meeting?

EM: If we do a face to face, it will likely be in Iqaluit because we typically try to rotate between Iqaluit and Ottawa.

KM: There is the coastal zone meeting in June in Iqaluit so it may be a difficult time to find accommodations, but perhaps others would already be up there for that.

*Baffinland will provide date and location at a later time for the next MEWG in-person meeting. (ACTION)*

*No additional comments. Call is adjourned.*

**\*\*\*ACTION\*\*\***

15. **Baffinland** to plan for next upcoming in-person meeting to be held likely sometime in June 2020.

Tables that follow provide summary of i) action items from current, ii) status update on action items from previous June 21, 2019, and iii) October 7, 2019 meetings.

**Table 1. Summary of action items update from February 25, 2020 MEWG Meeting**

#	Action Item	Action By	Status Update
1	<b>GN</b> to distribute to MEWG members the latest draft of ToR showing track changes.	Government of Nunavut	<b>In progress.</b> GN distributed latest draft version to MEWG members for comment on March 9, 2020. Specific period over which comments will be received was not specified by GN.
2	<b>DFO</b> to review availability of long-term datasets that may help to support selection of adequate EWI(s) relevant to the Project	Fisheries and Oceans Canada	<b>No update.</b> DFO to provide update during review of draft minutes and this will be updated in final minutes.
3	<b>Baffinland/Golder</b> will provide an EWI "What we Heard" summary document to MEWG members to comment.	Baffinland/Golder	<b>In progress.</b> In Q2 Baffinland will submit a summary to NIRB on the EWIs it is moving forward with for 2020 season. Further discussions can be held with the MEWG on the selection of indicators as part of future meetings.
4	<b>MEWG</b> to provide feedback to Baffinland/Golder on EWI summary document.	All	<b>Not yet started.</b> Dependent on completion of Action No. 3 to proceed.
5	<b>Baffinland</b> to organize a dedicated teleconference call to further discuss selection of EWI(s) based on feedback received from Action No. 4.	Baffinland	<b>Not yet started.</b> Dependent on completion of Action No. 4 to proceed.



7	<b>Golder/Baffinland</b> to provide calculations for coefficients of variation for abundance estimates in 2019 aerial survey report.	Golder/Baffinland	<b>Completed.</b> Request will be included in 2019 Draft Aerial Survey Report.
8	<b>Baffinland</b> to schedule a teleconference for week of March 2, 2020 to resume discussion of outstanding agenda items.	Baffinland/All	<b>Completed.</b> Teleconference was scheduled on March 5, 2020.
9	<b>Golder/Baffinland</b> to further discuss with <b>DFO</b> sampling methods/sample processing during benthic grabs.	Golder/Baffinland/DFO	<b>Not yet started.</b> Discussions to proceed during 2020 field season planning.
11	<b>Golder/Baffinland</b> to include power analysis results using the newly added sampling sites and will clearly indicate in report figures new and historical sites.	Golder/Baffinland	<b>Completed.</b> Request will be included in 2019 Draft MEEMP Report.
12	<b>DFO</b> to connect Golder with DFO Arctic char aging specialist	DFO	<b>Not yet started.</b>
13	<b>Golder/Baffinland</b> to include sampling frequency as part of 2019 MEEMP/Aquatic Invasive Species reporting	Golder/Baffinland	<b>Completed.</b> Request will be included in 2019 Draft MEEMP Report.
14	<b>MEWG</b> members to provide comments on past draft meeting minutes by March 13, 2020.	All	<b>Completed.</b> No comments received during comment period by any MEWG member.
15	<b>Baffinland</b> to plan for next upcoming in-person meeting to be held likely sometime in June 2020	Baffinland	<b>Not yet started.</b> In light of recent COVID-19 travel and work restrictions, no additional update is available at this time.

**Table 2. Summary of action items update from October 7, 2019 MEWG Meeting**

#	Action Item	Action By	Status Update
1	Baffinland to plan for next upcoming in-person meeting to be held in late 2019/early 2020	Baffinland	<b>Completed.</b> Meeting rescheduled for February 25 2020 following request by MEWG members to reschedule, as initiated by PC on January 8, 2020.

**Table 3. Summary of action items from June 21, 2019 MEWG Meeting**

	Action Item	Action By	Status Update
1	Baffinland to meet with the MHTO during the June 25, 2019 pre-shipping season meeting in Pond Inlet to discuss restricted zone and drifting zones for the 2019 shipping season.	Baffinland	<b>Completed.</b> Baffinland met with MHTO on June 25, 2019 and discussed potential options. A response was provided in a letter addressed to the MHTO, dated July 16, 2019, announcing the start of the shipping season.

2	Baffinland to provide clear information on when ice navigators need to be present onboard.	Baffinland	<b>Completed.</b> Ice analyst will be stationed on icebreaker when escort by icebreaker is required for safe travel to and from Milne Port.
3	Baffinland to verify how many vessels used in 2018 had D2 treatment systems installed.	Baffinland	<b>Completed.</b> In 2018 and 2019, 9 vessels procured by Baffinland had a D2 Ballast Water Treatment System (BWTS) installed on vessels.
4	Baffinland to look at alternative methods other than SITMs that can be used to communicate to vessel operators of the various mitigation and management measures to be implemented when sailing through the Regional Study Area.	Baffinland	<b>Completed.</b> A number of different communications occur before, during and after shipping season between Baffinland Shipping and Sustainable Development departments with Port Captain, vessel captains of Baffinland-procured vessels and Fednav to provide messaging around expectations regarding mitigation measures committed to by Baffinland.
5	All participating MEWG members to provide comments on the ToR to the GN	All	<b>Completed.</b> Comments provided by QIA, PC and GN on first version distributed by GN. Revisions to ToR were submitted by Baffinland on October 15 as part of responses to Final Written Submissions on the Phase 2 proposal.
6	Baffinland to reformat meeting minutes to include a table that clearly tracks “decisions” that were made at a meeting.	Baffinland	<b>Completed.</b> Draft minutes have been reformatted to reflect member comments. Capturing of specific recommendations will follow once revisions to the ToR are finalized.
7	Baffinland to include a section in future monitoring reports on the “Use of Community Input and IQ (or Inuit Perspectives) for the monitoring program.	Baffinland	<b>Completed.</b> Where relevant these will be included in 2019 Monitoring Reports (MEEMP/AIS, Aerial Survey, Bruce Head, SBO).
8	Baffinland to report back to the MEWG on what will happen to the spud barge during winter.	Baffinland	<b>Completed.</b> The spud barge, Nunavut Spirit, was used to facilitate transport of materials at Port. It left site in September 2019.
9	Baffinland to amend proposed sampling locations based on further conversations between Baffinland and the QIA.	Baffinland/Golder and QIA	<b>Completed.</b> Discussion occurred on Friday, Sept 13 with QIA consultant (BS) where an amended map was presented on proposed sampling locations.
10	QIA (via BS) to share most recent literature on use of fukui trap sampling with Golder.	QIA	<b>Completed.</b> BS provided literature on use of fukui trap sampling to Golder on June 27, 2019.
11	QIA (via BS) to share historical literature on marine sampling from Nanisivik Mine.	QIA	<b>Completed.</b> BS provided literature on use of fukui trap sampling to Golder on June 27, 2019.
12	All members to start considering the use of Non-indigenous species (NIS) instead of using the term “Aquatic Invasive Species (AIS)”. Baffinland would use the revised term in reports going forward.	All participants/Baffinland	<b>In progress.</b> Subsequent presentations/reports will use the revised term.

1 3	Baffinland/DFO to make available the Marine Fish Habitat Offset Monitoring report available to MEWG members.	Baffinland/DFO	<b>Completed.</b> 2019 report was provided to DFO on December 31, 2019, and will be distributed to MEWG members.
1 4	Baffinland to include in the Table of Contents responses to reviewer comments in final versions of program reports.	Baffinland	<b>In progress.</b> Baffinland will proceed with request in subsequent final versions of program reports.
1 5	Baffinland/Golder to further discuss with DFO methods (including survey track lines) to be implemented during 2019 aerial survey program.	Baffinland/Golder and DFO	<b>Completed.</b> Golder, QIA and DFO discussed survey track lines and methodology in advance of completing surveys. Email correspondence confirmed approval of methods on August 13, 2019.
1 6	Golder/Baffinland to provide the model(s) being used to estimate abundance.	Golder/Baffinland	<b>Completed.</b> Aerial surveys completed in 2019. Request will be included in 2019 Draft Aerial Survey Monitoring Report.
1 7	Golder/Baffinland to provide description of aerial survey methods as part of report including use of geometer, tablets, etc.	Golder/Baffinland	<b>Completed.</b> Aerial surveys completed in 2019. Request will be included in 2019 Draft Aerial Survey Monitoring Report.
1 9	QIA (via JH) to provide walrus haulout locations and relevant literature with the MEWG.	QIA	<b>Completed.</b> JH shared via email to MEWG on June 28, 2019 the list of known Foxe Basin walrus haulout locations (active and uncertain) and relevant literature. Additional literature was shared by DFO with the MEWG on July 8, 2019 upon request from QIA.
2 0	Baffinland Sustainable Development (SD) team to share the locations of walrus haulouts with the Baffinland Exploration team including a map showing these locations.	Baffinland	<b>Completed.</b> Baffinland SD team shared locations (via waypoints and map) of walrus haulout locations with Exploration team on July 3, 2019 including guidance for helicopter pilots (e.g., maintaining minimum distance of 5 km from known locations), if any travel were to occur in proximity of walrus haulouts. Subsequently, Baffinland provided follow-up to the MEWG via email sent on July 19, 2019, on subsequent actions that had taken place in response to QIA's email. This included a map that was developed by Baffinland showing each haulout location and the 2018 helicopter flight tracks separated by month, confirming that helicopters maintained >5 km distances from known haulout locations. QIA acknowledged Baffinland's response via email on September 16, 2019.

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Name: D. Bruce Stewart, Jeff W. Higdon

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Agency / Organization: Qikiqtani Inuit Association

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Date of Comment Submission: 30 April 2020

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#	Document Name	Section Reference	Comment	Baffinland Response
1	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Participants, p. 1	Grant Gilchrist and Gregor Gilbert both have the same "GG" initials. This should be changed for tracking in case both attend a meeting.  Insert "(MA)" after Melanie Austin.	Edit complete.
2	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	General	Mentions of "this figure", "this slide", and "right upper panel" work during the presentation but not always in the minutes. Including the presentation slide number with these references would make the minutes and presentations easier to correlate and thereby avoid misinterpretation.	Efforts to better characterize correlating slides will be captured in future minutes.
3	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2019 Shipping Season Update, p. 2	Please clarify whether the icebreaker convoys included up to a maximum of 4 vessels.	Confirmed. Revision made in minutes to clarify.
4	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2019 Shipping Season Update, p. 2	Slide 6 of the introductory presentation (LK) indicated that shipping began on July 17 and that the number of transits was limited by ice until July 30. Why did the icebreaker <i>Botnica</i> stop escorting vessels on July 26?	To clarify. The transit restrictions apply up until July 30 or until ice conditions are less than 3/10 (whichever comes first). As transits through ice conditions of less than 3/10 were possible before July 30, the transit restrictions were lifted before then, and escort was no longer required.

#	Document Name	Section Reference	Comment	Baffinland Response
5	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2019 Shipping Season Update, p. 2	Did the operations supply and infrastructure cargo vessels only make a single voyage each in 2019?	Each of the 9 freight vessels, 3 heavy sealifts and 5 fuel tankers made a voyage in 2019.
6	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Vessel Management Protocols/Mitigation Measures, p. 2	Please clarify where the vessel exchanged its ballast water after being found non-compliant with the D1 ballast water requirements (i.e., >30 ppt).	Following instruction from Transport Canada, the vessel proceeded to 073W. Following exchange, an amended form was provided to Transport Canada.
7	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Vessel Management Protocols/Mitigation Measures, p. 2	This section could include the steps taken to minimize potential impacts on the bowhead hunt.	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. Additional information regarding these steps were previously provided Baffinland's response to Final Written Submission (Appendix O, Attachment 5, October 2019).
8	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Vessel Management Protocols/Mitigation Measures, p. 2	RE: "Routing in designated shipping corridor", what is considered a "minor" deviation cf. a moderate or major deviation?	In sensitive areas, alerts are set up 1nm from the designated waypoints of the shipping corridor.
9	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Vessel Management Protocols/Mitigation Measures, p. 2	RE: 2 <sup>nd</sup> last bullet – change *considerations are warranted" to "considerations warranted".	Edit complete.
10	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Vessel Management Protocols/Mitigation Measures, p. 3, line 4	Change "that" to "than".	Edit complete.
11	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	General RE: presentations	Presentations were not available to AW on the phone and details of the slide presentations were not legible from across the meeting room. Please email participants the pdfs a few days prior to each working group meeting.	Efforts to meet this request will be made.

#	Document Name	Section Reference	Comment	Baffinland Response
12	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	MEWG Terms of Reference (ToR), p. 4	<p>"LK: The Working Group is an important component of what we are proposing for Phase 2."</p> <p>This isn't clear. The MEWG was a requirement in the original Project Certificate, it isn't being proposed for Phase 2. The Working Group will continue (and requires changes as identified in these TOR discussions) whether Phase 2 is approved or not.</p>	The Phase 2 proposal is an amendment to the existing PC. Baffinland has not suggested the term and condition requiring establishment and operation of the Working Groups be removed as part of the amendment process.
13	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Proposed Indicators and Indicator Species, p. 5	<p>Line 5: delete "related".</p> <p>4<sup>th</sup> line from bottom of section: change "screened it out" to "screened out".</p>	Edits complete.
14	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Thresholds – Calving Rate, p. 7	Change "JH: Is calves total number of population or females?" to "JH: are calves reported as proportion of total population or proportion of adult females?"	Edit complete.
15	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	ACTIONS, p. 8, bullet 2	<p>RE: bullet 2, Some narwhal datasets that may provide a baseline for morphometric comparisons include:</p> <p>Mansfield, A.W., Smith, T.G., and Beck, B. 1975. The narwhal, <i>Monodon monoceros</i>, in eastern Canadian waters. J. Fish. Res. Board Can. 32: 1041-1046.</p> <p>Finley, K. J., and E. J. Gibb. 1982. Summer diet of the narwhal (<i>Monodon monoceros</i>) in Pond Inlet,</p>	Comment noted.

#	Document Name	Section Reference	Comment	Baffinland Response
			<p>northern Baffin Island. Canadian Journal of Zoology 60: 3353-3363. [seasonal blubber thickness of males and females in 1978 and 1979 Pond Inlet catches; Kerry Finley or Rolf Davis might have the dataset.]</p> <p>Hay, K.A. 1984. The life history of the narwhal (<i>Monodon monoceros</i> L.) in the eastern Canadian Arctic. Ph. D. Thesis, Institute of Oceanography, McGill University, Montreal, QC. xvi + 254 p. [morphometric and reproductive data from scientific netting in 1963-65 and hunter catches in 1974-76]</p> <p>Roberge, M.M. and J.B. Dunn. 1990. Assessment of the subsistence harvest and biology of narwhal (<i>Monodon monoceros</i> L.) from Admiralty Inlet, Baffin Island, N.W.T., 1983 and 1986-89. Can. Tech. Rep. Fish. Aquat. Sci. 1747: vi + 32 p. [includes morphometric data on harvested narwhals from 1983, and 1986-89]  <a href="http://publications.gc.ca/site/eng/459973/publication.html">http://publications.gc.ca/site/eng/459973/publication.html</a></p> <p>Weaver, P.A. and Walker, R.S. 1988. The narwhal (<i>Monodon monoceros</i> L.) harvest in Pond Inlet, Northwest Territories: hunt documentation and biological sampling, 1982-1983. Can. Manuscr. Rep. Fish. Aquat. Sci. 1975: iv + 26 p. [morphometrics of narwhal from 1982 and 1983 Pond Inlet catches]  <a href="https://www.researchgate.net/publication/294736701_The_narwhal_harvest_in_Pond_Inlet_NWT_hunt_documentation_and_biological_sampling_1982-">https://www.researchgate.net/publication/294736701_The_narwhal_harvest_in_Pond_Inlet_NWT_hunt_documentation_and_biological_sampling_1982-</a></p>	

#	Document Name	Section Reference	Comment	Baffinland Response
			<a href="#">1983 Can Manuscr Rep Fish Aquat Sci 1975</a>	
16	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Bruce Head Shore-based Monitoring Program, p. 9	Have you identified factors that could account for the greater number of narwhals reported in 2016 (total and per unit of monitoring effort) cf. other years?	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.
17	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Bruce Head Shore-based Monitoring Program – Drone Study, p. 9	What type of acoustic recorder is being used to detect hunting?	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.
18	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Bruce Head Shore-based Monitoring Program – Drone Study, p. 9	Will a drone with camera resolution capable of distinguishing juveniles and identifying group composition be used in 2020? Is the camera lens polarized?	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.



#	Document Name	Section Reference	Comment	Baffinland Response
19	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Bruce Head Shor-based Monitoring Program – End of Season Interview, p. 9	PE comment - "sight" narwhal, not "cite" narwhal.	Edit complete.
20	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Bruce Head Shor-based Monitoring Program – End of Season Interview, p. 9	Our notes suggest that the last line of PE: which reads "...also the narwhals are very skinny." might better reflect the discussion if it read "...also for the past 2 years the narwhals caught in the shipping route were very skinny."	Edit complete.
21	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Ship-based Observer (SBO) Program, p. 10	The minutes should note that the end of season aerial clearance survey on 30-31 October saw narwhals on the 30 <sup>th</sup> and possible narwhal footprints in ice concentrations of 7/10ths or greater on both days.	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting.
22	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2019 Passive Acoustic Monitoring, p. 11	Acoustic hourly means presented in slides 38, 42, and 43 often exceed 120 dB—and some are around 140 dB re 1 µPA. It would be useful to see the variance around these means. Or at least more detail on how means are calculated.	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.
23	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Acoustic Monitoring –Daily Noise Exposure Period Estimates (120 dB), p. 12	Who is HC?	Corrected to read: CV.
24	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Marine Mammal Aerial Survey Program – Eclipse Inlet and Admiralty Inlet, p. 13	Section title (yellow highlights) should read: "Eclipse Sound".	Edit complete.

#	Document Name	Section Reference	Comment	Baffinland Response
25	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Marine Mammal Aerial Survey Program – Annual Comparisons, p. 14	RE: Line 1 of the section: “We are now dealing with a CV of 0.7.” This should be 0.07 based on a comment by PR (a correction of the CV of 0.14 on slide 58 in the presentation).	Edit complete.
26	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Marine Mammal Aerial Survey Program – Annual Comparisons, p. 14	Line 5 of section: “change” should be “chance”.	Edit complete.
27	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Marine Mammal Aerial Survey Program - Annual Comparisons, p. 15	"SA: Photographic surveys will have higher CV."  This should say "lower", not "higher", and should specify that it is in comparison to visual surveys.	Edit complete.
28	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Marine mammal Aerial Survey Program – End of Season Interview	Aerial observers provided interesting information in their end of season interviews (slides 59 and 60) that is not captured in the Minutes.	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting.
29	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2017-2018 Integrated Narwhal Tagging Report, p. 15	RE: PR: “A number of sub-surface...There were a number of non-statistically significant findings for dive Rate, time at depth (deepest 20% of dive, not bottom dives) and descent speed. There were no differences between exposure versus non-exposure.” The last two sentences should be revised and combined into one clear sentence.	Edit complete.
30	February 25, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2017-2018 Integrated Narwhal Tagging Report, p. 16.	Discussion immediately after line 13 was missed, essentially: BS: How might the use of modelled rather than measured noise levels have affected analysis of the narwhals behavioural reactions? PR: Using measured data would shrink the exposure distances, so they would be conservative. Might be useful to look at the data to determine the real ranges. We don't	Edit complete.

#	Document Name	Section Reference	Comment	Baffinland Response
			<p>think sound is the only thing whales are necessarily responding to (e.g., visual cues as well).</p> <p>-----</p> <p>QIA agrees that there is value in re-examining the data to determine within the 10 km assessment range what level of noise the narwhals are really reacting to. Is it at 120 dB or are they reacting at lower or higher noise levels? This information may be useful for noise threshold establishment.</p>	
<b>Agenda completed by teleconference on Thursday March 5, 2020</b>				
31	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Participants	<p>Add: ECCC - Anne Wilson (AW).</p> <p>Insert (KH) after Kim Howland.</p>	Edit complete.
32	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	2019 Physical Oceanography, p. 17, 7 lines from the bottom	Please clarify this sentence: "Historically the delta was being modified by wave action, and extending from, areas from the ore dock."	Edit complete.
33	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Remotely Operated Vehicle (ROV) program, p. 18	Alternative methods of delimiting the belt transect plots such that they are less susceptible to ice scour should be considered for 2020.	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.
34	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	MEEMP – Marine Fish, p. 19	Second sentence—not sure the Fukui traps were moved but I believe they were modified by adding weights and attaching a leader—check with PR.	The location of the fukui traps was modified in 2019 as captured in minutes. Edit made regarding addition of weights for clarity.

#	Document Name	Section Reference	Comment	Baffinland Response
35	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	MEEMP – End of Season Interview	“...before sending everything in the field...” needs editing for clarification.	Edit complete.
36	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Questions from MEWG members, p. 19	Change “boon” to “boom”?	Edit complete.
37	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Table 1, Item 3, pg. 24	Some narwhal data sets from ca. 1963 to 1989 that may help inform selection of EWIs are identified above (see #15).	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.
	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Table 3, Item 3, pg. 24	Please clarify if the 9 vessels with D2 ballast water treatment systems installed were using them and how many return trips they took in total in 2018 and 2019.	For clarity, meeting minutes are meant to capture items of discussion shared within the meeting. These comments are best suited for discussion during the meeting or submitted as comments on the monitoring reports.
	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Table 3, Item 9, pg. 24	Regarding the Status Update: “An agreement was subsequently made via email correspondence between Golder (on behalf of Baffinland) and QIA consultant on amended survey design.” There is no mention in the email string of “an agreement”. It was a discussion of design changes recommended by QIA. The changes Golder (PR) proposed for sediment and benthic sampling in 2019 monitoring were recognized by QIA (BS) in the email string as “a big improvement.” Sampling stations to monitor alluvial sediment inputs were not included in the amended survey design but may be added	Removed reference to “agreement”.

#	Document Name	Section Reference	Comment	Baffinland Response
			depending upon the outcome of a desktop study.	
	March 5, 2020 MEWG Meeting Minutes_DRAFT for MEWG.pdf	Table 3, Item 11, pg. 24	Column 2: Replace "...on sculpin sampling..." with "...on marine sampling..." Column 3: Replace "...on sculpin sampling..." with "...on marine sampling..."	Edit complete.

Name: Jacquie Bastick/Chantal Vis/Allison Stoddart

Agency / Organization: Parks Canada

Date of Comment Submission: April 30, 2020

#	Document Name	Section Reference	Comment	Baffinland Response
1	Feb 25 2020 Meeting Minutes	Pdf p 6, CV comments "Parks Canada is struggling with establishing quantitative thresholds because it is fairly difficult to determine so we are relying on expert opinions"	<p>PCA would like this comment clarified to indicate the following two points:</p> <ul style="list-style-type: none"> <li>• The difficulty lies in the fact that it takes many years of baseline data before quantitative thresholds can be established (to account for factors such as natural variability and, increasingly, climate change).</li> <li>• This is why PCA is suggesting that EWIs include indicators and thresholds based on expert opinion (western science and/or IQ or a combination of both).</li> </ul>	Edit complete.
2	Feb 25 2020 Meeting Minutes	Pdf p 6, PA comments ".... IQ has told us that there have been changes to body condition long before shipping started"	Please provide a reference(s) for this statement (e.g.: when/where was this IQ collected and from whom) and also describe if there has been any IQ collected that describes different understandings of when changes to body condition were first noticed.	<p>For clarity, meeting minutes are meant to capture items of discussion shared within the meeting.</p> <p>References for anecdotal statements during MEWG meetings will not be provided in this version of, or future meeting minutes. Edit to minutes has been made to clarify this is feedback Golder has heard during community engagement sessions.</p> <p>Information collected by the Nunavut Wildlife Management Board's Inuit Quajimajatuqangit</p>

#	Document Name	Section Reference	Comment	Baffinland Response
				Coordinator in July 2016 is available online, which can provide PC with some insights into the question being asked here.
3	Feb 25 2020 Meeting Minutes	Pdf p 7 re: discussion on EWIs	Is there a delivery date for the "What We Heard" summary re: EWI? (mentioned as an action item on page 8 of the minutes)	An update on the EWIs will be provided during the next MEWG meeting.



































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## Marine Environment Working Group (MEWG) Draft Meeting 22 Minutes

### Dates:

Day 1: Thursday June 25,  
2020/12:30 pm – 5:00 pm  
(EST)

Day 2: Friday July 10 2020 2:00  
pm – 4:45 pm (EST)

- From a **Computer (PC/Mac)** or a **Smartphone/Tablet (iOS-Android)**, click the following link:  
<https://cms.baffinland.com/invited.sf?id=064701805&secret=3rqNSk7iCgrsfVLhdlwrOg>
- From a **phone**, dial +14168142855, and enter the meeting ID (064701805)

Member Organization	Participants	Member Organization	Participants
Baffinland Iron Mines Corporation (Baffinland)	Lou Kamermans (LK) – (y)	Makivik	Gregor Gilbert (GG2) – (n)
	Steve Douville (SD)- (y)	Mittimatalik Hunters and Trappers Organization (MHTO)	Amanda Hanson Main (AHM) – (y)
	Connor Devereaux (CD) – (y)		
	Emma Malcolm (EM)- (y)		
	Genevieve Morinville (GM) – (y)		
Qikiqtani Inuit Association (QIA) and Consultants	Chris Spencer (CS) – (y)	<b>Observer Organization</b>	<b>Participants</b>
	Bruce Stewart (BS) – (y)		
	Jeff Higdon (JH) – (y)	World Wildlife Fund – Canada (WWF)	Andrew Dumbrille (AD) – (y)
Fisheries and Oceans Canada (DFO)	Kim Howland (KH) – (y)		Brandon Laforest (BL) – (n)
	Alexandra Sorckoff (AS) – (y)		
	Marianne Marcoux (MM) – (y)	Oceans North Canada (Oceans North)	Amanda Joynt (AJ) – (y)
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG) – (y)		Josh Jones (Scripps Institute) – (y)
	Anne Wilson (AW) – (y)		
Government of Nunavut	Brad Pirie (BP) – (y)	Nunavut Impact Review Board (NIRB)	Solomon Amuno (SA) – (n)
	Natalie O’Grady - (n)		Cory Barker (CB) – (y)
		Canadian Northern Economic Development Agency (CANNOR)	Arusa Shafi (AS2) – (y)
Parks Canada	Allison Stoddart (AS) – (n)	<b>Baffinland Consultants</b>	<b>Participants</b>
	Chantal Vis (CV) – (n)	Golder	Patrick Abgrall (PA) – (y)
	Jacquie Bastick (JB) – (y)	JASCO	Phil Rouget (PR) – (y)
		EDI	Melanie Austin (MA) – (y)
			Mike Settington (MS) – (y)

### **Agenda – Day 1 (June 25, 2020) and Day 2 (July 10, 2020)**

Day	Time	Activity
Day 1	12:30pm – 12:45pm	Welcome and Rollcall
	12:45pm – 1:15pm	Baffinland Update <ul style="list-style-type: none"> <li>2020 Shipping Season Overview</li> <li>Update on Extension Request to the Production Increase Proposal</li> <li>Impacts of COVID-19 on 2020 Marine Monitoring Programs</li> <li>MEWG Terms of Reference update</li> </ul>
	1:15pm – 2:45pm	2020 Marine Monitoring Programs Overview <ul style="list-style-type: none"> <li>Relevant to Project Certificate Terms and Conditions 1, 45, 76, 83, 83(a), 87, 89, 91, 99, 101, 103, 105, 109, 111, 112, 113, 114, 115, 126</li> </ul>
	2:45pm – 3:00pm	Health Break
	3:00pm – 5:00pm	2020 Shipping Mitigation Review <ul style="list-style-type: none"> <li>Relevant to Project Certificate Conditions 77, 87, 91, 102, 103, 105, 110, 111, 112, 120, 125(a), 183</li> </ul>
Day 2	2:00pm – 4:45pm	Welcome and Roll Call 2020 Shipping Mitigation Review (continued) Early Warning Indicator Development Update <ul style="list-style-type: none"> <li>Relevant to Project Certificate Terms and Conditions 110 and 112</li> </ul>

#### **Day 1: June 25, 2020**

Discussion and Comments
<b>Baffinland Update</b>
<i>Baffinland welcomes all participants from member and observer organizations.</i>
<i>Baffinland (EM) presents a summary of 2019 shipping season update, as described below</i>
<u>2020 Shipping Season Overview – slide 2</u> EM: BIM is gearing up for the shipping season, targeting to ship up to the approved 6 MTPA of iron ore. Expecting to begin the shipping season around July 23; however, this is dependent on ice conditions. Expecting 2 tugs and an ice breaker (MSV Botnica) to come in at the beginning and end of the season. We also anticipate ~3 cargo vessels at Milne Port and 3 - 4 fuel tankers.
<u>Update on Extension Request to Production Increase Proposal – slide 3</u> NIRB's recommendation to the Minister, extension request was approved to December 31, 2021. Updates to Project Certification No. 005 relevant to the marine environment include submission of a "Marine Shipping & Vessel Management"(MSVM) report to the NIRB prior to the commencement of the shipping season; modifications to term and condition 183: Collaboration with the MEWG on impact avoidance or mitigation strategies to be implemented; implementation of direction from DFO regarding any avoidance or mitigation strategies, including the cessation of any activity, for the protection of the marine environment; submission of bi-annual tracking table to DFO outlining collection of recommendations of the MEWG and any directions from DFO; and, where direction from DFO has been

provided, BIM must demonstrate efforts to implement this direction or a rationale if the recommendation has not been fully implemented.

AJ: When will the MSVM report be submitted to the NIRB? It would be helpful before shipping season?

EM: Before shipping season begins, any project-related vessels will be included in the report.

AD: Is the anticipated activity much different from last year?

EM: It is consistent to the 2019 year. Less ore carriers are expected. Due to current stockpile projections, and there will be less cargo vessels as well.

#### Impacts of COVID-19 on 2020 Marine Monitoring Programs Overview – Slide 4

EM: A letter was submitted yesterday (June 24, 2020) to the NIRB regarding the challenges BIM has faced due to COVID-19 and the impacts it has had on the planning of 2020 environmental programs. This submission should be posted on the NIRB Public Registry for your overview. Impacts include delays in securing NRI research permits, and the receiving of letters of support from MHTO for DFO license to fish. We are waiting for a QIA letter of support for a permit at Bruce Head related to the use of the drone. Thank you for all the letters of support that have been received so far.

CS: We are currently putting together a letter of support for you.

EM: Thank you. We are waiting to hear back from NRI on the status of research permits. We expect to be compliant with the terms and conditions of the Marine Environment commitments, however we will not be able to have Inuit environmental monitors from local Nunavut communities. With regard to ballast water sampling, this will be managed in two ways – the port captain will sample or provide unit to vessel (*\*\*\*update: Port Captains approved to board vessel and complete salinity/temperature ballast water testing\*\*\**). We were hoping to run a biological sampling program this year based on DFO guidance; however, this will be pushed to 2021. Various travel restrictions have impacted Inuit participation in marine monitoring programs. The roles by community members will be filled by Golder staff. COVID-19 has caused other considerations such as budget pressures. For example, the Inuit work force has been sent home and replaced with contractors. Further to this, various health and safety procedures have come at additional costs, such as dedicated flights to Mary River rather than flying commercially. Labs are also working at a reduced capacity and could result in a delay in results and recording deadlines. Contractors are also working from home dealing with daycare issues, etc.

#### MEWG Terms of Reference – Status Update – Slide 5

EM: I want to provide a high level overview, as well as want to quickly summarize what was discussed earlier. Conditions associated with the extension request, requirements outlined by the responsible Minister's for tracking and reporting on implementation of recommendations made by the MEWG will need to be integrated into the Terms of Reference (ToR). This also includes commitments to collaboration with DFO on marine monitoring programs. The timeline for the updated draft ToR is unknown at this time.

BP: In terms of reference we would prefer to have a concrete timeline to get this back to us.

EM: We should have something out before the end of summer.

JB: With regard to the ToR, the MHTO was not on the call in May to provide their feedback. Have you had a chance to discuss with them?

EM: Yes, we shared a meeting and a follow up call was offered. We have not been able to follow up and have a dedicated session on the ToR.

AJ: Thank you. We have noted this. We would hope that the work would occur much sooner so that the time at the technical meetings is not spent working on the ToR. **(M-25062020-1)**

JB: We second this. We should get ahead before the hearing. You noted there would be inclusion of anchorage selection locations. Note that the anchorage location near Bylot Island is within a wildlife sanctuary.

EM: You are referring to the January 2020 memo. The alternative exercise is that none of the other locations were suitable. At present we will continue to use Ragged Island anchorage locations.

AD: The agreement between QIA and Baffinland, has this been finalized and signed?

EM: BIM is working with QIA.

AS2: Are you complying with the MHTO terms on caribou and dust?

EM: We are having ongoing dedicated conversations about this with the MHTO. We can follow up on this conversation offline.

EM: The production increase report will indicate the shipping details. The report will be submitted to the NIRB in advance of the shipping season and will thus be available on the public record. A meeting date with the MHTO is not yet set. We can let you know once it is available on the public record. **(ACTION M-25062020-2)**

AJ: We would like some clarity of the language, if we could have some definitions. Can we use the NIRB report to identify this?

AHM: In the NIRB shipping report, there is no section on the use of icebreakers. Have you had discussions on the use of the icebreaker at the front and end of shipping season meetings?

CB: Going through the expectations, we should have a report in the next few weeks and this will be available on the public record through NIRB's Public Registry. The report will define ice breaking and ice management. The use of terminology may have caused some confusion. The use of icebreakers is standard practice for the purpose of assisting vessels entering an area.

AMH: Thank you for the information. I would like to ask someone from Transport Canada whether icebreaker vessels have come in before Baffinland vessels.

**\*\*\*ACTIONS\*\*\***

1. **Baffinland** to provide tentative schedule for the ToR amendment process
2. **Baffinland** to notify to the Working Group that the Shipping Report has been submitted to the NIRB.

**2020 Marine Monitoring Studies**

*Relevant to Project Certificate Conditions 1, 76, 83, 83(a), 87, 89, 91, 99, 113, 114, and 126*

*Golder presents a summary of proposed programs for the 2020 field season*

2020 MEEMP Program (Slide 2)

PR: The focus of this presentation is to outline what is being proposed for the 2020 marine-based monitoring study which includes monitoring at Milne Port, as well as a series of marine mammal-focused studies. We have various technical leads on the call standing by if there are any questions you need answers to. The 2020 Milne Port-based program is an integrated program that includes the Marine Environmental Effects Monitoring Program (MEEMP) and the Aquatic Invasive Species (AIS) monitoring program. Both these monitoring programs are integrated along with the habitat offset monitoring program which is tied to the fisheries authorization for the existing ore dock and the new freight dock that was installed last year (2019). The MEEMP program is a multi-parameter environmental effects program. It includes monitoring marine water quality, marine sediment, marine vegetation, fish habitat, and fish health. The sampling design is based on metal mining technical guidance for environmental effects monitoring and includes statistical approaches for detecting project impacts on the marine environment as predicted in the environmental impact statement. This is the 6th consecutive year of effects monitoring for this program. The field program is scheduled to occur over a 28-day program from July 28th to August 18th to accommodate for flight schedules at the mine. We have a team of 9-10 people. The sampling design for the MEEMP program is based on a radial gradient design extending outwards from the ore dock. The ore dock represents the potential point source for contaminants such as ore dust, waste water, as well as physical modifications to the project that might be related to the marine infrastructure or the marine vessels using the port. The radial pattern is designed to detect effects based on

a gradient of key components that are tied to numerical indicators. An example of an indicator includes that of metal concentrations.

#### MEEMP – Water Quality (Slide 3)

PR: The MEEMP – Water Quality Program is basically a series of five sampling events over a 4-week period. The point of this program is to monitor potential changes in the water quality associated with site drainage, and the treated F1 discharge which includes iron ore stockpile runoff. In the previous years, there were a total of four (4) water quality stations near the primary site of discharge which is shown in the yellow icons in the inset map on the right and includes one station immediately adjacent to the site discharge point. Three additional stations located about 250 meters slightly offshore are arranged in a radial pattern from that nearshore location. Modification to the program this year involves additional compliance monitoring for a second discharge monitoring location known as MPO6 - the four (4) yellow icons to the left. MPO6 is the discharge associated to the stockpile containment pond, consistent with the monitoring design for primary discharge. MPO6 does not represent a continuous discharge. Rather, it discharges intermittently and only follows testing of the water at the containment pond itself to confirm it meets the required discharge criteria. Golder will be coordinating with the Milne Port Site to ensure our sampling is conducted during active discharge at MPO6. Five (5) samples will be taken over a 4-week period at each station, where we will collect physical chemical measurements from surface to bottom (i.e., water depth profiles using hand-held water quality meters looking at PH, temperature etc.). In addition, we will collect discrete water quality samples. Samples are processed at site and then will be sent off to ALS labs to assess a range of parameters, including pH, hardness, total organic carbon, nutrients, metals, petroleum, hydrocarbon, and various other items. We also have a water depth profiling program that extends into Milne Inlet all the way up to Ragged Island. The vessel-based sample is more opportunistically done, using the research vessel during field sampling events. We try to target a series of surface to bottom CTD (Conductivity Temperature Depth) casts, similar to previous years, and representing the areas along the shipping corridor and we try to target, if time allows, separate sampling events for all those stations. Those stations are shown in purple and pink in the slide.

#### MEEMP – Marine Sediment Quality and Benthic Infauna (Slide 4)

PR: This component of the project is based on a radial gradient design extending out from the ore dock. The radial pattern is designed to detect project effects, such as changes in metal concentrations in sediment, or changes in biota in contrast to increasing distance to and from the point source, being the ore dock. The design for both components (i.e. epifauna and epiflora) is based on repeated measure in distance regression analysis, where each station is resampled annually. The repeated measures analysis is an alternative to the Before and After - Control Impact (BACI) ANOVA design. This offers a higher sensitivity to detecting to changes. The design includes 4 transects that radiate out from the existing ore dock and the new freight dock transect. The east and the west transects shoot out in those respective directions and they are arranged along the 15-meter depth contour to minimize any confounding influence of depth on sentiment. The 15-meter contour was selected and has not changed since the start of the program. It has the highest level of biodiversity, based on baseline sampling. It is also the area that we feel is most unaffected by winter or ice scour. Both transects extend approximately 1,500 meters to the east and to the west. We also have the north and the north east transects that extend offshore from the existing shore dock to a distance of 2,000 meters. They correspond to a water depth of 100 and 120 meters up the offshore end, respectively. These transects include both the distance and the depth gradient for consideration for EEM design. Each of these 4 transects have a total of 15 sampling stations that are arranged at increased distances from the ore dock. That was a change that was implemented in 2019 and that is what we are carrying forward for this year. A coastal transect has historically been part of the MEEMP. This transect starts at the eastern end of the east transect and extends north along the 50-meter depth contour for about 4 kilometers. The coastal transect extends outside the predicted stations. We looked at that in more detail this winter and we made the decision that the stations along that transect were mostly redundant and did not add significant value towards the interpretation of the gradient from Project's influence. Mostly because the sampling



design for the sub-seafloor and because sampling does not require a reference location, we expanded the in 2019 going from 5 stations to 15 stations. Based on these considerations we are proposing to remove the coastal transect from the MEEMP sampling design.

#### MEEMP – Benthic Epifauna and Epiflora (Slide 5)

PR: This program aims to survey within a series of 10 rectangular belt transect plots which are 1 m X 5 m in dimension. These were installed in 2018, where 5 are in the reference area and 5 are in the study area, in 10 and 20 meters' deep water. The belts consist of 2 hollow steel pipes that are connected to 5-meter-long chains laid along the sea floor. These transects are surveyed using the ROV that we have on site using the underwater video system. Last year when we returned to site they were subject to some scour issues where three (3) or four (4) were moved out of the site - we flagged this as a concern. We are unsure what it will look like this year and, because we didn't have divers on site last year, we weren't able to reposition them and were unable to survey all 10 stations. There are two items that we are going to address this year. One, we have divers so we will go to those sites and survey them and ensure the ones from last year are ok, and if not, we will try and fix those we were unable to fix last year and rearrange them, and then use the ROV or the divers to survey along the lanes. We are also looking at an alternative this year that are less subject to scour issues such as construction sample quadrants 1 m x 1 m (20 or 30) and place them in control and reference areas. We also had some issues with the sediment baskets that were deployed as part of the aquatic invasive species (AIS) program – they were also taken out by ice.

#### MEEMP – Marine Fish (Slide 6)

PR: Fish sample procedures in 2020 will be consistent with previous years. The goal is to provide a general characterization to the fish community near the ore dock and adjacent areas of the port. Fish data from all the sampling locations are used to construct species-specific length and weight distributions and sampling for these programs. It is done two to three times weekly over the course of the 4-week program. We have submitted applications to DFO for license to fish for scientific purposes as well as the animal use protocol permit. These are being processed. Fish sampling techniques that we will be using this year are similar to other years. We have gill nets, fukui trap, fyke net, trawling, beach seine, and angling. Most of the fishing will occur in the area of the ore dock and freight dock but there are some additional areas further out in Assumption Harbour. All the fish collected will be transferred to containers filled with aerated station water. Photos will be taken for each species and each station. All fish captured are identified and assigned to species categories and undergo external examination. They are measured for length and weight and then returned to the aerated container to allow for recovery prior to release back in the area of capture. Unless the fish were targeted specifically for the fish health survey component of the program, any incidental fish mortalities will be retained for fish tissue chemistry for the 2 target species which are *Hiatella* and fourhorn sculpin. Fish are processed in the field and stored on ice prior to sending on to labs where they handle the aging and the tissue analysis and stomach content analysis. All sampling done is in accordance to the DFO permitting requirements. The fish health survey component is slightly different from previous years in that it is aligned with federally regulated requirements under the Metal and Diamond Mining Effluent Regulations (MDMER). We have selected fourhorn sculpin based on previous sampling results showing that the species was in inadequate abundance in the area to support. The study also harvested for local consumption and is a resident species more ideal than Arctic char. Target sample sizes for both were 20 adult males and female and if we are unable to determine the sex of the organism in the field we will be collecting a total of 40 of each species consistent with MDMER guidance on effect indicators for the fish health survey include measures of growth, reproduction, condition, and survival.

#### Locations Shown in Milne Port (Slide 7)

PR: This is a figure showing where sampling locations were in 2019 - you can see how they were spread out in Milne Port.

#### Aquatic Invasive Species (AIS) Program (Slide 8)

*Relevant to Project Certificate Conditions 76, 87*



PR: The AIS program is the second integrated program at Milne Port. It is designed to address potential risks of non-indigenous species (NIS) or AIS to the marine environment that would could originate from ship ballast water. This is based on areas with the highest likely invasion. Monitoring is conducted at a surveillance level. The program itself consists of independently-collected data across multiple levels, looking at marine vegetation, zooplankton, etc. The goal is to establish a comprehensive inventory of existing marine data in the project area as a point of reference for any new species identified over time and to evaluate potential changes in community structure that may be linked to NIS introduction. The marine organisms that were collected in the baseline years in 2010 and 2013 also contributed to the overall NIS/AIS inventory. Monitoring is basically conducted annually until results are gained satisfactory to the reduction in monitoring in the marine environment.

AD: Are there any signatures that you can trace back to ballast water or grey water from ships? Can you actually determine the source or is there nothing specific or unique in those where the species come from exactly?

PR: There are a couple of ways to determine between specialized hull invasive versus ballast water invasive. Is that what you mean?

AD: Yes - just wondering if you can trace it back?

PR: What we do to address that, when you find a potential NIS or AIS, is to do a comprehensive desktop research exercise. Often when you go through this process you find species that are identified as hull or ballast water species. Research or literature reviews usually help. We are working with DFO to develop a ballast water sampling program onboard the vessels so we can look at what is in the ballast water biologically. To date we have only really looked at physical parameters of ballast water. Essentially we would look at plankton sampling exercise on one or more ballast water samples on ships to determine what animals are coming from what parts of the world – this is an ongoing exercise. That is addressed through the ROV-based ship hull surveys which identifies species level as well as what colonization we are seeing on those certain parts such as the stern of the ship. We are looking at taking DNA samples this year, collecting specimens so they can be sent back to the south for DNA analysis and preserving them which has not been done before.

KH: Another way to potentially tell what might be coming in is to look at where vessel origin and the type of invasive species established in those regions – this can assist with identifying potential invasive species in ballast water. We have done this with DFO in some of our risk assessment work to narrow down potential species to complement the sampling. I would also offer to do some water sampling close to the vessels or in the ballast water with genetics methods (eDNA) screening. You could possibly use this in the future.

PR: Due to COVID restrictions we are unable to go on the ships this year.

PR: The slide discusses some of the sampling techniques involved in the AIS program, ranging from zooplankton, benthic infauna to epifauna with the ROV video work, along with divers this year. We also have sediment baskets and surveys - we have amped up the program tremendously. We want to ensure the baskets are in there long enough over the next several years so that we are able to get representative samples back and increase confidence that they will be there next year. We have purchased 80 settlement baskets and plates.

AD: Do you know how many ships are treating their ballast water?

PR: Yes, that information is detailed in our response in the NIRB annual report. Off memory, of the ~80 ships, about 20 to 25 (about a ¼), of the ships are repeat ships and come 2-3 times per summer.

SD: Approximately 9 ships were asked to do a ballast exchange prior to release and to also treat at the same time. So, all ships will do a ballast exchange on the high seas and then treat as it comes into Milne

AD: As far as % of transits go, do you also detail that in the annual report Phil?

PR: It is about 25% of total of ore carrier transits that had treatment systems on board and they were doing both the exchange and treatment.

AD: The importance of the work you are doing, DFO is soon to release their study about effectiveness of treatment systems. Their study will also highlight that the system is currently not highly effective and not meeting standards. Therefore, a lot of work is to be done to strengthen the system.

Sample Locations (Slide 9)

PR: This slide is showing where we sampled different locations in 2019. The large majority is focused in the Milne Port area which is the only area where ballast water releases occurs. It is only released at the existing anchorages in Milne Port or released at the ore dock itself while the vessel is moored up and getting ready to load. Ragged Island is also a focus of our sampling program, there is no ballast water released in that area but there are ships that can go and anchor there. We have a program target to look at invasive species that would come from other means than ballast water.

2020 Marine Fish Habitat Offset Monitoring Program (Slide 10)

*Relevant to Project Certificate Conditions 45, 76 and 115*

PR: Fish Habitat Offset Monitoring Program as part of environmental permitting, DFO determined that the construction of the Existing Ore Dock would result in serious harm to fish due to habitat loss as defined by DFO and permanent changes to the ecosystem, therefore potentially affecting the productivity support of local fisheries. To compensate for losses associated with the ore dock construction, BIM submitted a fish offset plan to DFO which involved the addition of a coarse rock apron around the Existing Ore Dock that would serve as fish habitat. The fisheries authorization application was approved by the Minister with prescribed monitoring requirements assigned over a set course of time – 6 years. The offsetting habitat was installed by BIM in 2015 and monitoring has occurred every year since.

Accordingly, 2020 is considered the final year of the established 6-year program. The final year would be conditional upon showing that the fish habitat worked as planned. We have different monitoring objectives for the alternating years. In year 1 and 5 we focused on looking at the integrity of the rock substrate using video surveys, and years 2, 4 & 6 we are focused on the productivity of the substrate using underwater surveys of the coarse rock. That program will be taking place for part of the 4 weeks and in addition to that, there was a freight dock that was constructed at the port last year in August 2019, to the east of the Existing Ore Dock and similar work at that location is required. This will be year 1 of the monitoring requirements. Total monitoring period for the freight dock spans a 10-year monitoring period, with monitoring completed every second year. We would target to monitor in August to coincide with the open water season and also the peak growth period for marine vegetation. The objective of year 1 is to assess the coarse rock for structural integrity and for deterioration. That will be done with diver-based surveys and video survey methods, such as the ROV. We will also be assessing organisms that are colonizing the substrate through collections of samples and through diver and video-based surveys. We will also be looking at fish species, etc., through dive surveys.

Physical Oceanography Data Collection Program (Slide 11)

*Relevant to Project Certificate Conditions 1, 76 & 83*

PR: There is an additional component to the Milne Port-based program, which is the physical oceanography data collection program. The scope of work in 2020 aims to satisfy requirements of the environmental effects monitoring program, by continually collecting records of environmental conditions. It also aims to address project certificate conditions 1 & 83 that are tied to monitoring relative sea levels in storm surges in Milne Port. It also aims to improve the spatial and temporal resolution of measurements occurrence in the area of Milne Port, including resolving better current direction with better equipment.

BS: Related to slide 4, I noticed you removed stations between the dock and I wondered what the rationale was at this point?

PE: Yes, so this is the sampling design ideally for the Phase 2 moving forward, but we are still committed to sampling over a continuous 3-year period - those sampling stations that are historical would exist between the existing ore dock and the freight dock, we will continue to monitor those remaining stations until the 3-year time period expires, I believe this is year 2 of the 3-year period.

BS: With regard to Slide 5, you mentioned the new 1-meter concrete designs. Can you provide some more details in terms of depth? That would be useful going forward. Also, how you would figure on attaching the baskets efficiently.

PR: We are still in the process of figuring that out. The way I envision it is we would frame up concrete blocks approximately ½ foot tall, 1 m X 1 m; small enough that we can manage it with the A frame. The exact location of them we would be directed toward target areas that are associated with the highest productivity, but also in areas that cover the full zone of influence and represent good quality habitat that is present in the site for the study sight. For the reference site that we are proposing, it is along the eastern shore where the coastal transect existed. On most of the subfloor there is fine grain materials and it is pretty unproductive, so we would be deploying some of those units in those areas but we also want to be targeting areas that have harder-based substrates to let you know that they are in representative areas, biologically functional and non-functional – same goes for the reference area. We should be able to put more structure to the actual design in the next week or two and I will be sure to share that with you. Some of this will be finalized on site with the systems and divers in play. In terms of how to attach the settlement baskets, what we have been discussing is putting in a “D” or an “I” bolt on the corners of the unit so the baskets will hang off the corner. Then there would be a “D” bolt sitting in the middle of the concrete block or pad that would have some sort of small float to it or something that extend to a foot or 2 above the bolts with flagging on it so that we can easily see these things and recover them with a diver. A GPS will be put on them as we don’t want to waste too much time searching for them and the visibility can get pretty bad in August with the plankton in the water. If you have any ideas, we are open to your advice, Bruce.

KH: It sounds like you have a research vessel this year, is that correct?

PR: Correct, it has been sea trialed in the Great Lakes but has not seen any Arctic water as of yet. It is a 30 ft. aluminum build and is also a landing craft with a boom arm on the port side of the vessel.

KH: Are you planning to switch completely to using Van Veens for infauna? Is there a plan to use trawling for the epifauna?

PR: Yes.

KH: We have done a lot of that type of work so if you need any advice feel free to contact us.

PR: My colleague Dan may be open to hear what works and will be in contact with you as needed. **(ACTION M-25062020-3)**

BS: Will you be collecting more clam samples? I had a comment on the annual draft report and whether you are going to work on that program to make it easier to assess and compare the data that you get because of the differences in age.

PR: Yes we are still continuing to do so - it is one of the two target species. I haven’t reviewed your comments and don’t know the full details, but I do have associates on the line;

Raine: We are targeting 20 male and 20 female if identifiable as such, if not 40. From those organisms we will be getting full competent endpoints, plus the tissue chemistry. Are you looking for more information than that? Or are you looking for more organisms?

BS: It is more to make sure samples between years are comparable; there is so much variability in some of your sampling, both for the fish and the *Hiatella*, that it is hard to say if you are comparing apples to apples or apples and oranges and that could be for various reasons related to the age grouping or locations of the samples. Or, whether for example in the case for char sampling fish coming from a different stock - there are a number of comments relating to that in the QIA comments on the marine report, so maybe have a look at that and we can talk about that at some point, that way we are not holding this up. Another question. You are not able to monitor the ballast tanks this year, but Kim mentioned eDNA sampling. You may want to look at the eDNA of the outfall. Perhaps Kim could address this?

PR: I guess you are talking about the collection of water samples at discharge point for ballast water and whether eDNA analysis, after the fact, would be possible and using that approach? I just don’t know.

KH: As long as you can get a sample, and I do not know what would be involved from getting it outside the vessel - something I could chat about with Sarah, I don’t know if she is on the call or not. I’m not sure how easy that is to do.

The other option would be for you to collect a sample when you know the ship is discharging. So, you could take a sample in the area where the discharge is happening. I don’t know about getting right under it, so that could potentially be an option. Keep in mind with the eDNA, that it can’t distinguish live versus dead organisms, so it would give you an

idea of what the ships had been carrying but it won't give you an idea on which ones are alive and which ones are dead, which can be an issue. Also from the traditional sampling methods we are quite interested in developing the eRNA approach and they are using that approach in New Zealand and Australia, but it is a new technique and the samples could potentially be preserved for that. It involves preserving them in the RNA later and is actually easier to work with in terms of shipping in ethanol. It isn't a hazardous substance or anything -it is a buffer type solution, so that might be an option to collect samples in a way that you can do either eRNA or eDNA analysis on those. If eDNA can be done, we work with Université Laval as they have a set rate that they charge for the analysis, you would need to recognize that the species list is somewhat dependent on what you can actually resolve to see dependent on the DNA library that are publically available. We right now are able to identify about 50% of the sequences and match those up with species. You can keep the sample and do it in the future as well. You can go back when those libraries are more complete. I would say it is something worth trying if you can't do some of the other things you were planning. It is relatively easy to collect those water samples and we have lots of expertise with doing so. The other thing we tried last year and we haven't gotten the results back yet, but to sample the front and back of the vessels to look if we could pick up a signal from the biofouling. Typically, the vessels end up orienting in the direction of the wind when they are anchoring, so that is something that can be done even if you can't board vessels or go to close to them.

PR: Sounds good, can you forward us this information? I would like to better understand what the processing would look like, the time and the cost for the eDNA stuff. **(ACTION M-25062020-4)**

KH: I can give you an idea, when we are on the boat it involves taking a water sample in a bottle and then the filtration process takes a maximum of 5-10 minutes. It depends if the sample is dirty and the volume of water you are sampling, and whether you can use hand filters.

EM: I suggest that they have a secondary conversation to the specific details, so that the group can move on with the agenda.

#### 2020 Marine Mammal Aerial Survey Program (Slide 12)

*Relevant to Project Certificate Conditions 99, 101, 103, 109, 111, and 126*

PA: In the 2020 program we will focus around three (3) survey legs - the first leg in mid-July starting before shipping operations starts; the second leg in mid-August; and the third leg at the end of shipping season, the clearance survey. One of the big differences this year has been outlined by Emma earlier about COVID-19 and the implications. Last year we flew out of Arctic Bay and Pond Inlet. This year we can't do that, the survey will be based out of the Mary River Mine Site which adds a few complications based on transit time to the survey locations but are still manageable operation. We will still be using 4 observers on the aircraft this year and 1 data recorder so we will be able to perform the surveys as double-ended platforms.

#### Marine Mammal Aerial Survey Program (Slide 13)

PA: We will be using the same survey design plans as in 2019 using line-transect surveys. The data will be recorded onboard the aircrafts and we will be transitioning to photography surveys when we reach large aggregations which are more than 60 animals or when a survey coordinator indicates they can't keep up with the sighting. We have made some software improvements for this and will hopefully save some time with the data clean up after the fact and reduce potential errors. So, Leg 1 we will be surveying the floe edge if possible if ice is still present. The idea is to categorize what the distribution of narwhal would look like at the floe edge as the survey continues as the ice clears up in Eclipse Sound, and then they will expand the survey to include the other survey strata and look at territories in the location of narwhals in the area at that point. The focus is in Pond Inlet and the Baffin Bay strata. In Leg 2, the August survey will be using the same strata as the 2016 DFO photographic aerial survey and 2019 BIM aerial survey. Leg 3 will be focused on the clearance survey which is a 2 to 3 day survey in good weather conditions looking at conditions while flying over the ship track line and at areas historically reported as entrapment areas, just to see if there is any potential risk of marine mammal entrapment in the areas. We will be looking at open water area and if there are any areas where there are animals locked in by ice.

#### Marine Mammal Aerial Survey Program (Slide 14)

PA: The survey methodology is much the same as last year - visual survey at 1000 ft., flying at 100 knots, and collecting environmental data on ice cover, sea state, fog and glare using the double-platform with primary observers at the front and secondary observers in the back of the aircraft recording data; the photographic survey will be at 2000 ft., flown at 120 knots and using the same proposed camera set-up as 2019 which is a two Canon DSLR camera fitted with 35 mm lens angled obliquely covering 839 m on each side of track line. Marianne, is there any feedback regarding moving away from oblique to going straight down or are we ok with oblique survey protocol?

MM: I raised few issues in the report, but with the decrease of the detection when you move away from the transect line. It is not wrong but I think it makes things easier when you take your photos face down. However, the way you have handled it in the 2019 report was fine. We provided comments on the 2019 report, and it would be great if you could address the comments from the 2019 report.

PA: Thanks, we are still filtering through the comments. If there are issues with regard to the specific survey design, I don't believe there was anything that was a real issue just a couple of questions. When we looked at in terms of the camera, the timeline in looking straight down and what it meant in our ability to survey some of the fiords and our transit time could still cover Eskimo Inlet and White Bay but it could still sacrifice our ability to survey the other fiords so that comes as a tradeoff. The other advantage of doing the oblique surveying is that if we have a technical issue with our data it allows us to go back to the photography and get more distance of the animal and the track line. We used that to our benefit last year in one of the surveys early on in July where we had a technical issue. Maybe we can have another conversation afterward as needed, and go over in terms of timeline, Marianne. Any more concerns?

Otherwise I will go back to the pros and cons and go back to the methodology. **(ACTION M-25062020-5)**

AJ: It feels like we are not using the MEWG to its full value. Hearing about discussions between regulators and BIM – I am uncomfortable with all of these offline conversations. The point of the MEWG is to hear these conversations. I appreciate the focus on the differences in the years in these presentations and the hard work gone into the planning, but in the future we might not need to know details like which company is doing DNA analysis or licenses as those are regulator-specific. If in the future if we could minimize these presentations to the differences and the sticker points that would be appreciated. Things like this need to be brought to regulators a week before so they can talk offline and bring the sticker issues to the MEWG. I would prefer in the future to use this time to discuss the 2019 comments and how they are influencing the 2020 monitoring programs.

EM: Thanks, on our end BIM is trying to strike a balance in being transparent, trying to provide individuals an opportunity to make comments on our program. Not everyone on the MEWG has an expertise to review a slide like this and then be able to provide comment on it without having that discussion before being walked through it. Also, we don't have the same members every year, that is part of the value of going through these. Your comment about feeling uncomfortable about offline conversations with regulators around this marine mammal aerial survey program that we are running is meant to compare estimates, and since DFO is not able to run them this summer that is why Patrick is emphasizing this. If people are good with this, we can run more quickly through the presentation.

#### Marine Mammal Aerial Survey Program – Leg 1 (Slide 15)

PA: It shows the start of the first flight around July 9, 2020. With the COVID restrictions we are limited to getting in and get out of the Mary River Mine Site this year, so we have to take a 2-week schedule to get in and out this year (12-day period) flight schedule prior to the shipping operations. It is one aircraft survey in the same area of Pond Inlet (floe edge). You can see from the photo the breakup is beginning to happen just east of Pond Inlet, between Bylot and Baffin Island there.

#### Marine Mammal Aerial Survey Program – Leg 2 (Slide 16)

PA: As you can see the same survey lines as last year, the start time for the survey will be August 20<sup>th</sup>. This is a tradeoff of being there the first two weeks of August or the last weeks of August. Based on the flights coming in, the last two weeks is the time that works best. It is a 13-day flight and two aircrafts. One of the things we are possibly looking at

changing is that unlike 2019, we will not have an aircraft based in Pond Inlet and one in Arctic Bay. Both aircrafts will be based out of Mary River. We have an opportunity to fly the Eclipse Sound area in one day with both planes and the next day flying to Admiralty Inlet.

#### Marine Mammal Aerial Survey Program – Leg 3 (Slide 17)

PA: At the end of the shipping season the observers will be flying into Mary River at the end of October 27th and then fly the shipping route in areas of past entrapments over a 2-day period with a one aircraft program.

BS: Why are you not flying the fjords again this year?

PA: The plan is to fly the fjords again this year. However, if we switch to a single camera straight down then it means we have to fly twice as many lines in our photographic areas in Milne south and that extra flight time in the air is the tradeoff. If we move to oblique camera to single camera we would have to cut a few of the fiords because we don't have the fuel time which is a trade off with a straight down camera.

MM: You emphasized several times that you want to ensure your surveys are comparable to the one we do. The 2019 survey you did was very well done and very comparable. We try to do a survey the first 3 weeks of August, so pushing it to the end of August might not be comparable because we think that narwhal begin to move out of the area around August 24/25. Then you capture whales from other stocks even from Somerset that start their fall migration, also their diving behavior might be different. I would aim for the first half of August if you have a choice.

PA: We discussed this earlier - in the perfect world we would have taken the 2 weeks in between, from August 10-24 would have been ideal but it was just not feasible due to flight schedules to and from Mary River. We are still seeing a lot of animals coming in the first week in August.

#### Bruce Head Shore-based Monitoring Program (Slide 18)

*Relevant to Project Certificate Conditions 99, 101, 105, 109, and 111*

PR: This is a program that has been running for a number years and started as a pilot in 2013 open water season, and then conducted annual as an environmental monitoring program for a five-year period from 2013-17. It wasn't run in 2018 and then came back online in 2019 and this summer. The overall objective of the Bruce Head program is to look at narwhal response to shipping activities along the northern shipping route in Milne Inlet and particularly in the pinch point in southern Milne Inlet. Data is collected on relative abundance and distribution we call Relative Abundance and Distribution (RAD), and then group composition and behavior. That data is collected concurrently with ship tracking data from satellite and shore-based AIS systems. We also collect environmental conditions and anthropogenic, which is smaller hunting or recreational vessels along the shore line. The program is observer-based, done from a cliff at an observer station by a team of marine mammal observers and supplemented by a drone or a UAV component, and integrated with a passive acoustic monitoring program executed by JASCO.

#### Bruce Head Shore-based Monitoring Program (Slide 19)

PR: The program is over a 4-week study period from August 4 to September 1, corresponding with the open water season. We have 16 hours of continuous monitoring over the day - this might extend if we find some shipping activities happening at night, to capture those vessels. This is the study grid you see here. The left plot is similar to the original design by LGL, shipping lane in the purple line; last year we added an additional two strata to the very bottom left to have a portion of the study for animals not in the travel mode and rather in a resting social mode as they work their way into Koluktoo Bay. These strata are used for the basis of RAD, whereas the information on behavior and group composition is focused closer to the observer platform highlighted in the black section (Behavioral Study Area, 'BSA'). There is an additional study area we are calling the visual acoustic correlation (VAC) study area. We look at specifics of animal behavior, specifically changes in group composition in concert with changes in vocal behavior. We are looking to see whether mother-calf contact calls are being established, as well as are looking at how an animal's behaviour change might happen in concert with vocal changes. We are going to be potentially changing the shipping lane this year to be closer to Poirier Island - this was feedback that BIM has received and are working with their Shipping



Department to see if this is feasible, whether it would benefit our program, as well as whether it would allow a cleaner way to look at animals.

Bruce Head Shore-based Monitoring Program (Slide 20)

PR: There is a drone component - a much more detailed aerial by InDro Robotics. They have worked in the Arctic before. The drone team is a group of three individuals using Alta X Freely units for the duration of the program. For part of the process, we have put in a submission for a special flight operations certificate that would allow us to fly beyond the line of sight. The advantage would be some of our design components would look specifically at animal movements in Koluktoo Bay that is currently not possible to reach from the platform as it is out of sight. We want to thank those on the call today who wrote letters of support for that initiative. We are just waiting on a response on that.

Proposed UAV Surveys (Slide 21)

PR: Overview of what we are looking at. Drone components for the survey all have different drivers and yield different data points. Confirmation of group composition, behavioural study area (BSA). Focal follows – Northern Shipping Route, Koluktoo Bay. Visual acoustic correlation (VAC) survey – AMAR3 at the base of Bruce Head. Systematic survey – stratified study area (SSA) in the far field strata.

2020 Passive Acoustic Monitoring Program (Slide 22)

*Relevant to Project Certificate Conditions 101, 105, 109, 110, 111, 112, 184*

PR: This program is led by JASCO, and is a two-part program. We have 2 recorders that have been under the ice since last September and programmed to stay recording so that we can get ice breaking noise recordings in the fall and then programmed to come back on July 7th so that we can do the same thing in the spring shoulder season. One of the recorders is located at Bylot Island and the second one is located closer to Ragged Island. JASCO will be coming in to recover the two recorders. Also, they are planning to deploy an additional recorder at the base of Bruce Head in the same location - it was deployed last year. We are looking at options of extending it by a couple of weeks.

AJ: The Bruce Head recorder that is going in, is that the same as the MR3?

PR: Yes, the one circled in black. The same as last year.

PR: The goal of the passive acoustic monitoring program is to characterize ambient underwater noise levels along the underwater shipping corridor as well as ship noise levels. We are also looking to monitor acoustic water presence along the marine corridor and to compare measured levels versus the modeled ship noise levels through underwater monitoring supportive of the environmental assessment. We have a number of University of New Brunswick students reaching the end of their program working on their thesis, one is going to be at Bruce Head this year doing field work (Sam Sweeny). He is looking at the behavioural changes in narwhal in fluctuating sound fields resulting in the passing ships as well as other sources (i.e., hunting). He is focused on the 1/3 octave band levels that were provided by JASCO along with the ship tracking AIS data and the surface behaviour data. He is also looking at behaviour traits associated with when there is no detectable ship noise. He is scheduled to complete his thesis in the fall, so I expect we will have it by that point. Crystal Prier is looking at vocal change behavior – a full characterization of the full narwhal repertoire. She is using data from Bruce Head and also from the accusondes from the animals that were recorded from Tremblay. She is on the same time schedule as Sam. We have another student Jake who is looking at examining relative differences in audibility of different ship types. This would help identify types of ships.

AJ: Is Sam willing to share his data with Josh?

PR: We will share relevant updates as they become available.

JH: Is the new observer station at Bruce Head going in this year?

PR: That is the plan, it is at Milne Port where they are making some modifications. It should be set-up at the site in the next 2 to 3 weeks.

JH: In relation to passive acoustic monitoring (PAM), JASCO is going to retrieve the two devices in early July, is that correct?

PR: The end of July, sometime after July 21 when we go to site. We will pull them last so we can maximize our recording time.

BS: With regard to Slide 19, when you look at the right hand panel there seems to be an additional string that extends right across the mouth of Koluktoo Bay, and I wondered if you were making use of that and how?

PR: That is K-stratum we identified last year that we were going to put in, both J and K were added last year to look at milling around the Koluktoo Bay area.

JJ: You are going to recover your acoustic recorder from Bylot Island and Ragged Island sites and deploy one off Bruce Head where you previously had AMR3. The only acoustic recorder that you will have during the bulk of the open-water season will be from formally AMR3? What is the expected duration of that recording?

PR: That is correct for this year. If we get it in late-July and they pull it out the last day of August, it will be a 1-month period. We are trying to explore options to extend it by a couple of weeks by coming back in late September. We are working on a tight time frame because of COVID and the 14-day stay at site is tied to the schedule.

MM: We had discussed moving hydrophones in different locations before. Is this on hold until next year?

PR: Correct, it is due to COVID, budget, and scheduling.

GM: In January 2020, the MHTO brought up concerns. They requested we start limiting the number of units we put in the water.

PR: The reasoning the MHTO gave is that they broadcast sound that scare off the narwhal; however, these units do not radiate any noise as they are passive units.

EM: Due to COVID we were also asked to reduce any costs and streamline any programs possible.

AHM: Was there a motion for the MHTO about putting hydrophones in the water as we haven't heard of this?

AHM: Passive acoustic Monitoring (PAM): I don't know if there was a motion or maybe a resolution from the MHTO asking BIM to reduce or restrict the number of PAM or maybe this was a phone call that I wasn't part of the discussion. I will need to circle back with the MHTO unless BIM has something that you can provide the group?

EM: This has come up several times at various engagements and meetings with the MHTO related to PAM, which was the information shared before by Golder. There is a perceived concern that the recorders are emitting noise that has the potential to disturb marine mammals. I am not sure what your consultation processes with the MHTO is with your programs, but as part of BIM we have that feedback. We have tried to talk with members of the board and tell them these recorders do not emit any sound and had documentation to that effect - we are trying to find a balance of using western methods.

AJ: We might be able to help because we have someone in the community who knows how to retrieve the phones, I can talk to PR offline about that.

EM: It is rented equipment from JASCO, thus they are responsible for safe and careful retrieval of their equipment.

#### \*\*\*ACTIONS\*\*\*

3. **Golder** to connect with DFO (Kim Howland) as needed to discuss sampling plan logistics.
4. **DFO (KH)** to share literature on eDNA with Golder/Baffinland.
5. **Golder** to connect with DFO (Marianne Marcoux) as needed to further discuss 2020 aerial survey timeline.

#### **2020 Shipping Mitigation Review**

*Relevant to Project Certificate Conditions 77, 87, 91, 102, 103, 105, 110, 111, 112, 120, 125(a), 183*

EM: We wanted to do a discussion today on our plans for our 2020 shipping mitigation measures - A response to previous comments we have heard under the terms and conditions 183 is to get feedback and collaborate with the MEWG about our shipping and mitigation practices. We want to provide the MEWG with additional details regarding

our approach to the development of mitigation measures and how we monitor for those measures through our monitoring programs.

#### Slide 2

EM: This figure is a high level overview of a standalone approach to the development of mitigations and how we have approached development limitations for our operations. This includes the identification of potential effects and developing specific mitigations that will minimize each of the potential effects identified through the environmental assessment process. Implementation of those mitigations and associated monitoring through data collection programs occurs on an ongoing basis. A comparison of the results of those monitoring programs and then an assessment on whether there is any additional need for adaptive management and if the mitigation isn't adequate to be protective of the environment.

#### Summary of Mitigation Measures (Slides presented by EM)

##### Marine Mammals (Slides 3 and 4)

- Defined shipping lane throughout Regional Study Area (RSA)
- Maintain constant speed and course, when possible
- All Project vessels will reduce speeds to a maximum of 9 knots when travelling within the RSA
- No breaking of landfast ice
- Limiting the number of transits at the start of shipping season, between the period of 01 July and 30 July, a maximum of one icebreaker transit (with escorted vessels) will occur per 24-hour period where ice concentrations of 6/10 or greater cannot be avoided along the shipping route
- Between the period of 01 July and 30 July, a maximum of two icebreaker transits (with escorted vessels) will occur per 24-hour period where ice concentrations of 3/10 or greater cannot be avoided along the shipping route.
- Establishment of 40km buffer zone at floe edge
- All ice breaking activities will be conducted outside of the period of ringed seal parturition, nursing and breeding periods
- When marine mammals appear to be trapped or disturbed by Project vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife move away from the immediate area (as safe navigation allows)
- All Project vessels will be provided with standard instructions to not approach within 300 m of a walrus or polar bear observed on sea ice
- Adherence to walrus haulout buffer zone guidelines set by USFW and US FAA

AD: I thought Baffinland was treating the RSA as a no discharge zone and was committed to no pollution discharges, grey water, garbage etc., did that fall off the list? It has been on the list before?

EM: My apologies. Yes it is noted on slide 14, and is an additional mitigation. We did commit to not having any of the ore carriers discharge any grey water or treatment sewage in the RSA, which goes above regulatory requirements. That is a commitment that we made starting last year.

AD: I get to complement BIM. I also understand that your ships do not have scrubbers which release contaminated waste water. That is going above Canadian regulations; it is a very good mitigation measure etc. Great to see it!

##### Marine Mammals (Cont'd) (Slide 5)

- All Project vessels will be provided with standard instructions to operate their vessel in a manner that avoids separating an individual member(s) of a group of marine mammals from other members of the group
- Project aircrafts (helicopter and airplanes) will maintain a set altitude over marine waters when possible
- Establishment of restricted "no-go" zones to avoid key sensitive areas (Koluktoo Bay, Tremblay Sound, Bruce Head shore)
- No drifting in Eclipse Sound
- Maximum of 3 vessels anchored at Ragged Island and/or drifting
- Limit vessel idling

##### Marine Environment (Slide 6)

- Commitment to follow international and Federal regulations for ballast water management

- Interim commitment for vessels with International Marine Organization (IMO)-approved treatment system to conduct both treatment and exchange
- Continued implementation of ballast water temperature and salinity testing
- Commitment to work on early-response plan with DFO if AIS is identified

#### Shipping Mitigation and Management: Ship Strikes (Slide 7)

- 9 Knot speed restriction
- Accepted as highly effective mitigation for reducing likelihood of lethal vessel strikes
- BIM remains the only operator in RSA to implement speed restrictions on vessels

PR: The objective is to outline what mitigation measures have been put into place over the course of the Project and how the process is driven. Our intention for monitoring programs is to test impact predictions made in the FEIS. We want to identify if we are seeing impacts and if the impacts are worse than predicted, to see if existing mitigations proposed in the FEIS are functional and to advise on whether additional adaptive management or additional mitigation measures are required for the program. Over the 5 years when you look back, there was a limited list of mitigation measures.

PR: As the project developed the Northern Shipping Route, the ice breaking and ice management component was introduced, as were associated impacts. We worked to minimize the number of restrictions during the sensitive periods based on ice conditions at that time. Maximizing the number of escorted vessels during the escort so that you wouldn't be pressured operationally to have vessels come in sooner than that.

PR: Further mitigation measures associated with avoiding impact on marine mammals are implemented. Ice breaking is not operating during any peak sensitive period for ringed seal nursing and breeding. Those with operations in early July, those activities would all be ceased by that point. There is a commitment to avoid being within 300 meters of a walrus or polar bear when they are on ice.

PR: This table (ref. slide 7) shows the different vessel types and the travel speed. There are vessels travelling in the RSA that are going 15 knots; those are cruise ships, Canadian Coast Guards and icebreakers.

#### Acoustic Masking and Disturbance (Slide 8)

- Restriction of transits in heavier ice conditions → minimize amount of time where noise levels would onset disturbance and avoid behavior

#### Shipping Mitigation and Management: Acoustic Masking and Disturbance (Slide 9)

PR: This slide is a visual of what we are seeing on the MSV Botnica ice conditions. From the 2019 season there are full video recordings from the front of the MSV Botnica, unfortunately we have not been able to board ships this year and therefore video recordings have not been completed.

JJ: Could those video data be made available to get some ice concentration for all the MSV Botnica transits? It would be helpful with some of the work with acoustical monitoring that we are doing.

EM: We have offered to share the video in the past with DFO, but the file is enormous and that is why we haven't distributed it to a wider group. We can look at how to share that offline with you. **(ACTION M-25062020-6)**

JJ: I understand the desire to reduce the duration of masking events or disturbance events during heavy ice concentration and the method is to limit the number of transits, convoy transits, when the ice concentration is 4/10 or greater. Presumably there are icebreaker operations during lower ice concentrations period. Wondering if there can be a provision for limiting the number of transits daily of the icebreaker itself as it is the biggest noise source? Perhaps extend the transit restrictions related to the icebreaker into all the icebreaker operations including the sea ice concentration days?

EM: Once the RSA is broken up and you have the navigable path below 4/10, the MSV Botnica will essentially stop doing escorts and bunker down for the season. Generally, it is only running when it is required - the MSV Botnica is not actively escorting vessels throughout the summer.

JJ: Good, glad to clarify that. During sea ice formation, how do you gauge sea ice concentrations during the ice formation and how is that related to these transit restrictions that are ice concentration-focused?

EM: We start reducing the number of transits during the end of the season by running more of the convey operations having the icebreaker escort more than one vessels), as well as by limiting the number of vessels that are going to be travelling through RSA at any one time at the end of the shipping season. The other key thing related to the need for the travel restrictions during the early shoulder season is because it is a sensitive time when you may have narwhal staging at the floe edge. We wanted to be careful of that and establish more formal time-based restrictions. We don't

have data from the fall season for 2019 because those are the same recorders that are currently deployed at Ragged and Bylot Island that we are going to pick up in July. Once we've had time to review that data and if that seems to be a required step, that is something we may consider moving forward.

Shipping Mitigation and Management: Acoustic Masking and Disturbance (Slide 10)

PR: JASCO table – this is a summary of what we were seeing in terms of exposure period for the five (5) recorded MSV Botnica transits past the AMAR recording at Bylot Island. We weren't able to get any icebreaker transits on top of this recorder. It was always ice free when the ships were going through. It gives you a snap shot of what you are dealing with in terms of the range of noise exposure period under different situations. It also gives a snap shot of what the MSV Botnica sounds like when it isn't escorting any vessels, as shown in row 2.

Shipping Mitigation and Management: Acoustic Masking and Disturbance (Slide 11)

PR: The main one is the avoidance of breaking landfast ice as it is the loudest ice breaking activity. Active avoidance of ice as safe navigation allows, essentially what the vessel attempt to do when ice is in the 6/10 or less and then the 9 knot speed restriction.

Shipping Mitigation and Management: Acoustic Masking and Disturbance (Slide 12)

PR: This visual was pulled from JASCO's original showing transit speed at 15 knots versus 9 knots.

EM: Those noise footprints are based on model data not monitoring data.

Shipping Mitigation and Management: Acoustic Masking and Disturbance (Slide 13)

PR: In an effort to produce the acoustic disturbance in a special sense, as identified earlier, we looked at implementing the 40 km buffer zone at the entrance to the RSA. That would still be the plan this year. Restricted no-go zones have been implemented that are off limits for shipping, and these are tied to key sensitive areas as flagged by the communities that hunting camps and/or where we know narwhal or other marine mammals tend to occupy. There is also the 3 vessel maximum at Ragged Island and/or drifting in Eclipse Sound that was implement over the past few years. This maximum count of vessels was extended to the anchoring at Ragged Island.

Shipping Mitigation and Management: Marine Environment (Slide 14)

PR: Managing invasive species and discharge of contaminants to the marine environment is managed through ballast water testing at the port – we also have a commitment for ore carriers not to release grey water or treated sewage into the RSA. Further to this, we ensure compliance with all applicable IMO and Transport Canada (TC) regulations for biofouling.

Shipping Mitigation and Management: Marine Environment (Slide 15)

PR: This slide depicts an example on the type of compliance monitoring carried out on vessels in the past few years. For the last few years, BIM has monitored the salinity of the water in a randomly-selected ballast tanks to ensure the vessels comply with the physical thresholds to release ballast water. This is going to be expanded to a biological monitoring program so that we better understand what potential invasive species these ships may bring with them from other parts of the world. Such programs will come back online in 2021 provided we can board the ships again.

Shipping Mitigation and Management: MEWG Feedback Summary (Slide 16)

EM: I went through the comments on the draft report that we received to check to see if any additional mitigations were recommended by members – this is what is being presented here. Here are the 2 recommendations that I was able to find. The first comes from the QIA regarding targeted interventions for specific types of vessels calling out the cargo and fuel tankers and ship speeds. They have seen great improvements; this is an area of continued improvement for the company. We will continue to engage with those various suppliers throughout the shipping season and continue to monitor. One of the challenges with the cargo and fuel tankers is that they are serving other customers within the area, so once they have dropped off supplies at Milne Port they are no longer under contract to Baffinland while they are operating within the RSA. They technically become under contract to their next customer - that is one of the challenges we have and the ability to communicate with them regarding ship speed and being in compliance when they are on route to another port. There are no federal obligations around ship speed in the area. This is the biggest challenge. The second recommendation was from the DFO.

MM: This is related to a comment we made before, which is on slide 9 and the restriction according to the ice concentrations. We think that it should not be just restricted to a shorter season. We would like to see it for the total open season. We don't see the logic of restraining it for the shorter season. It is specifically around not limiting those transit restrictions after July 30<sup>th</sup> if ice is still breaking up after July 30<sup>th</sup>.

JJ: As I understand it, your comment refers to a listening range reduction (LRR) and in this case, it is relative to this noise that is created by the icebreaker. What we understand is that it is not actually related to whether the icebreaker

is breaking ice or not; it is the presence of the icebreaker itself and the displacement pumps that are going. I understand in your request to apply these mitigation protocols to the icebreaker or all the times that the ice breaker is operating regardless of what the sea ice concentration may be. Is that correct?

MM: These restrictions are bound by dates and I think they should be bound by the environment and the conditions, not just dates.

EM: Thanks for that clarification. The reason for the selection of the July 30<sup>th</sup> date is based on 20 years of historical ice data. At that time, conditions are almost always less than 3/10. Once breakup starts to happen it happens really quickly over a period 1-2 days in some cases. In a very heavy ice year that wouldn't be the case. This has been an outstanding disagreement - understanding our rationale for the selection of that date for and previous recommendation made by DFO. I think the other point to mention on this is hypothetically, if this year on August 1 ice conditions were 7/10th throughout the RSA as Phil mentioned the ship reduces speed significantly - a typical benefit in conditions above 7/10, I think last year transits had about 20 hours from the edge of the RSA to Milne Port; inherently the number are restricted, as a built-in safeguard. This warrants further discussion and response from BIM.

AD: I would strongly support moving that July 30<sup>th</sup> date and if you are going by environmental conditions and their relation to mitigation measures, it doesn't make sense to hold onto that date. Many of us in MEWG support this.

EM: BIM will provide a response to DFO once it receives a formal recommendation that will be tracked in a response table share with DFO and the MEWG. Now that we have had this discussion, we understand this recommendation may be submitted. We will discuss it internally and provide that response once it is formally submitted.

JB: We support this as well, we don't believe this is a lot to ask; previous responses from Megan have been that it was related to your operational constraints - that it was too expensive. That goes against what the company and Brian Penney said publically -that you will operate to the best environmental standards, recognizing that it will be rare to have the open-water seasons in place. It isn't a huge ask to extend mitigations by 2 to 3 days, keep that perspective in your deliberation as well.

EM: Thank you, noted.

EM: I would like to resume this meeting next week sometime.

AJ: I would prefer to resume when we have the responses to the 2019 comments. The group is going to benefit from that discussion. We need to incorporate that into the 2020 monitoring programs.

EM: That is not realistic, our technical teams are fully dedicated to preparing for our monitoring program this summer. There is no way we could provide responses to comments issued - it isn't feasible. We are happy to discuss the comments at a later date. The priority of our consultants is to ensure we are prepared for the upcoming field season. Keep in mind that the NIRB have asked for an update on us finalizing the EWIs. We need to make progress on that.

AJ: We need to set expectations for what to expect when we are giving comments. We need to set expectations on when changes are incorporated into the next year's program. If you could ask your team to look at the comments and see which ones could become recommendations, that would be better than nothing.

Just focusing on slide 16 could be dangerous, some of the other comments could be helpful when turned into recommendations.

EM: I appreciate your feedback; we will see what we can do.

AJ: Can you identify some comments by next week?

EM: I will let you know.

## Day 2: July 10, 2020

### Welcome All

### Discussion and Comments – continued from June 25<sup>th</sup>, 2020 meeting

### \*\*\*ACTIONS\*\*\*

6. **Baffinland** to explore possibility of obtaining real-time ice condition data from MSV Botnica when transiting through ice and to share this with the MEWG.



EM: This meeting will include finishing our discussion related to Baffinland's 2020 Shipping Mitigation Review and the Early Warning Indicator Development Update.

EM: We ended our previous discussion on the 2020 review mitigation presentation related to MEWG feedback summary.

EM: The basis for the request by DFO was for BIM to extend vessel transit restrictions after July 30<sup>th</sup>.

EM: Are there any questions relating to this presentation 2 weeks ago?

JB: There were multiple emails about the MEWG and icebreakers. Please ensure we set some time aside today at the end of this meeting to be addressed.

EM: We should have time around 4:00 pm to discuss further.

EM: If there are no other questions about mitigation we will move on to Early Warning Indicators (EWI). Patrick will lead the discussion and then Phil will take over. We will talk about the history of the EWI development and engagement with the MEWG, then we will touch on current literature on EWIs. Phil will talk about potential behavior responses with EWI.

### **Early Warning Indicators**

*Relevant to Project Certificate Terms and Conditions 110 and 112*

#### Early Warning Indicators - Purpose (Slide 2)

PA: This slide outlines the steps we have taken thus far with regard to selection of Early Warning Indicators (EWIs). The purpose of EWIs is to achieve compliance expectations with the terms and conditions of NIRB Project Certificate Condition No. 110 & 112, which regard looking at mechanisms to ensure early identification of potential effects, and determine if negative impacts from vessel noise are occurring.

#### Relevant Project Certificate Conditions (Slide 3)

PA: Outlines relevant project certificate conditions No. 110 & 112 – appropriate early warning indicator(s) to ensure rapid identification of negative impacts along the southern and northern shipping routes.

#### Final Environmental Impact Predictions (Slide 4)

PA: Marine mammals are predicted to exhibit temporary and localized avoidance behavior along the shipping route and in Milne Port. No abandonment or long-term displacement behavior is anticipated. With the effective implementation of mitigation, the residual environmental effect of disturbance from ship noise on marine mammals was predicted to be Not Significant.

#### Marine Mammal Monitoring Programs (Slide 5)

PA: This slide reflects the various marine mammal monitoring programs from 2006 to 2019.

#### MEWG Engagement on EWIs (Slide 6)

PA: This is a recap of engagement on EWIs. Our meeting in Ottawa on June 6, 2018 led to a commitment to providing a framework for the development of EWIs. During a teleconference on September 13, 2018, we discussed a proposed framework and requested suggestions of EWIs within 4 weeks. Feedback was received from Oceans North, Parks Canada, Fisheries and Oceans Canada. On November 29, 2018 an in-person meeting with the MHTO in Pond Inlet was held. Also, another in-person meeting in Ottawa was held on December 10, 2018 to discuss suggested EWIs.

#### Suggested EWIs (Slide 7)

PA: Lists the suggested EWIs, bold items are the potentials early warning indicators, which we believe are more concerning or might be the primary focus moving forward.

#### Monitoring Programs and Proposed Indicators (Slide 8)

PA: The left column highlights the different proposed indicators and the monitoring programs for which we collect data for.

#### Indicator Species (Slide 9)

PA: This slides speaks to what species we looked at to apply early warning indications to. It also highlights expected magnitude and overall confidence of impacts. It was suggested that species narwhal and ringed seals be considered as part of the selection for EWIs. The role of the monitoring programs is to provide additional data on assessing. Narwhal falls into level 1-2 in the confidence as it relates to vessels as opposed to seals. It made more sense to focus on the low-level confidence and move forward with the narwhal.

Initial Candidate Early Warning Indicators (Slide 10)

PA: Initial early warning indicators from the MHTO included monitoring of regional abundance, change in calving rate, and change in body condition.

Follow-up MEWG Engagement (Slide 11)

PA: Engagement with the MEWG Feb 2019 where we requested suggestions of thresholds. No suggestion on thresholds were received by March 31, 2019. We held an in-person meeting in June 2019 in Iqaluit to discuss monitoring. On February 25, 2020, we held a meeting in Ottawa to discussed calving rate as a potential EWI to move forward with. We received suggestions from the MEWG to ensure that indicators informed by IQ were used (MHTO, PC). We also received suggestions from the MEWG to focus on behaviour response indicators (GN).

EWI Development Context and Consideration (Slide 12)

PA: We have recognized what is comparable from other projects and what consistently exists in the scientific community. There is no regulatory guidance or approach available on EWIs. Baffinland is currently trying to invent the wheel.

Canadian Shipping Projects (Slide 13)

PA: We looked at examples of other Canadian shipping projects to provide early warning indicators. There were none.

Methods for Monitoring for the Population Consequence of Disturbance in Marine Mammals (Slide 14)

PA: There is very little scientific literature from Booth et al. 2020 methods for monitoring; workshop group put together this publication, but how does the paper related to these items?; line-transect surveys, aerial surveys for the program; cons include imprecise estimates, low power of detection; may take many years to identify large-scale changes; recommendation to monitor demographic characteristics and indications of health to identify drivers of population-level changes; specifically, body condition or caving.

Methods for Monitoring for the Population Consequence of Disturbance in Marine Mammals: a Review (cont'd) (Slide 15)

PA: Change in body condition is a proper measure of health. However, a con associated with this is that observed changes may be the result of the environment - hard to discriminate between Baffinland-related versus natural environmental variability or other causes; body condition may be associated with other issues that are unrelated to Baffinland activities.

Methods for Monitoring for the Population Consequence of Disturbance in Marine Mammals: a Review (cont'd) (Slide 16)

PA: Change in calving rates -the ratio of calves/pups to mature females or change of population is sensitive to changes in fertility, calf survival, and juvenile survival.

Methods for Monitoring for the Population Consequence of Disturbance in Marine Mammals: a Review (cont'd) (Slide 17)

PA: Modelling suggests the ratio may be a suitable EWI. However, there are concerns with sole consideration of calves to mature females. The analysis of population simulation data indicates that some of these demographic characteristics, particularly the proportion of immature animals in the population, may provide a better early warning of population decline.

Proportion of Immature Narwhal in Milne Inlet: Monitoring Indicator? (Slide 18)

PA: This slide highlights the proportion of immature narwhal observed during the Bruce Head Shore-based monitoring program with baseline data collected -2015 is the start of shipping. Calves we are seeing are from previous year.

#### Slide 19

PA: Information from literature has provided direction on EWIs. Southall et al. (2007) severity scoring relates to behavioural responses.

EM: With regard to the scientific community, what are they doing?

#### Slide 20

PR: This table outlines comments made during the previous MEWG meeting.

PR: This table provides an overview of the severity scoring system. These can be separated into action behavioural responses and level of action response. This is based on both captive and wild settings. They use the term significant and non-significant responses based on if the response can be defined as harassment, as defined in Marine Protection Act (US)

PR: Significant response would be harassment and would require additional permitting.

#### Criteria and Thresholds for US Navy Acoustic and Explosive Effects Analysis (Slide 21)

PR: These are consistent with Southall score of 0-4. They are within typical baseline behaviours and unlikely to disrupt an individual to a point where natural behaviour patterns are significantly altered or abandoned. No active avoidance. A lot of these were already collected as part of tagging or through our Bruce Head Shore-based Monitoring programs. We've tried to correlate these as part of what we collect in our programs and where we want to start collecting data on in 2020 programs.

#### Criteria and Thresholds for US Navy Acoustic and Explosive Effects Analysis (cont'd) (Slide 22)

PR: Moderate severity response would be considered a significant behavioral response if they were sustained for a long duration. Long duration is defined as a response that has lasted for the duration of exposure or longer, regardless of how long that may have been. Aggressive behaviors, massive tail clapping - how can we look at this? Do we look at duration? How long is the animal reacting after the ship is no longer there? This is different for all species.

#### Criteria and Thresholds for US Navy Acoustic and Explosive Effects Analysis (cont'd) (Slide 23)

PR: High severity responses are those with possible immediate consequences to growth, survivability, or reproduction. These are always considered to be a significant behavioral response.

#### Behavioural Response-based EWIs (Slide 24)

PR: Based on the monitoring data to date, there is opportunity to investigate behavioral responses as potential EWIs for marine mammals. The advantage is that we have data to support it. It allows us to track the Project effects and other environmental conditions and stressors on the animals.

However, there are challenges. It is a new concept and therefore has never been used. The science is not there yet, but we can look at old data and try to see patterns.

#### Monitoring Indicators and Action Levels for Marine Mammals (Slide 25)

PR: These are monitoring indicators and action levels for marine mammals. This slide outlines a system that could be applied to this program.

EM: Alternatively, we are looking for feedback - this is where our thinking is at this point. Our goal with this workshop is to get your questions and try to provide answers, as well as let you know this is the approach we are contemplating.

BS: What is the definition of exposure period?

PR: It gets down to the transit of the ship (individual transit events); incoming and departing crossings with the animal. For instance, narwhal change dive behavior within 1 km of the ship; this is premised off of shipping military sonar activity research and play back studies.

JH: Slide 8, how would Bruce Head data speak to regional scale as I believe it would be difficult?

PR: You cannot get regional abundance through the Bruce Head program. We can get relative abundance. What we want to see that we're not seeing changes at the regional level, but the pinch point where the corridor is where we would want to see that the animals in that area are not changing over time. Are we still seeing the same number of adults, calves, etc., and local species density relative to the exposure event, which in this case is shipping.

JH: We expect to see ringed seals included in discussion with the MHTO.

EM: We've identified potential opportunities for further study on ringed seals. At this point, the PC is better focused on narwhal. This is what we will move forward with on EWIs at this point, but we can get some considerations on future monitoring on how we can incorporate other observations.

PR: Helpful to know what it is specific to.

JH: This information comes from local hunters - vessel impact on seal, community observations are important; can we find out from the hunters? They don't agree on all five (5) pathways.

LK: We need to draw out the detail and look into this further with the MHTO. Narwhals are the main concern and ringed seals may be included.

JH: Thresholds - we cannot speak until indicators are identified.

PR: The original ones in the EIS are tied traditionally to 10 % of this, 10% of that. There are easy ones in terms of 10% of habitat loss. Others are 10% change in the stock inside the RSA that ties to abundance but nothing in there ties to reproductive or behavioural responses. If there is a way to modify them so that they fit into how they fit into what we've presented, please let us know. We've deliberated a while on how we can incorporate responses into an adaptive management process.

EM: The genesis around this from the NIRB is because monitoring to the 10% would be an almost impossible task. Moving away from a stock abundance threshold action for additional monitoring or introduction of additional mitigation measures, is the underlying reason for introducing EWIs. In terms of using stock abundance, it's not necessary.

JH: Definitely support behaviour; however, how would you do the studies? What kind of data can be collected and how? To reiterate we definitely support the use of behavioural indicators. To go back to the body condition indicator, you indicated that it may be difficult to link body condition to the Project. But I think that could be said to others. For calving rate, how would you relate this to vessel noise?

JH: Emma please send the papers and material to everyone regarding Southall.

JH: Does the updated Southall et al. (2019) discuss any updates to severity? Phil, nothing has changed in the 2019 paper regarding severity of score.

EM: I will compile the literature and send out to everyone, to review early next week. **(ACTION M-25062020-7)**

AHM: I would appreciate it if you could please circulate the material/references ahead of the working group meetings.

AHM: Jeff had a good introductory comment on ringed seals. I would like to echo this. The MHTO has been clear on wanting other species to be included in the EWI program. I will get in touch with the MHTO in terms of the seals, and of course with narwhals with regard to the early warnings triggered (i.e., "how the MHTO sees this?"), will require additional input with the MHTO.

AHM: on Slide 8 - looking at aerial survey again?

PA: There is a tradeoff between looking at condition through visual surveys versus picking up accurate counts.

EM: Visual and photographic survey are being done in aerial surveys programs.

AHM: Shore-based monitoring - how reliable are these surveys??

PR: We have had issues last year at Bruce Head with the drone-based studies. We have a large proportion of Inuit doing the studying who know the animals.

AHM: The shore-based program is something that will be done. One of the questions is that it's looking at a small area in the RSA. Has there been any discussion to do this elsewhere either north or south, and take into consideration other areas of the route.

PR: this question comes up every year. We agree it would be an advantage. You are limited by distance; you can't run a program past 5 km. You want to coordinate a program where the observers are close to vessel interactions. Based on all of the tagging data and visual surveys, it is the area that is the highest use area. It's a pinch point. It's a very representative area. Not to downplay other areas, they are very important, but we target other areas through PAM, or through tagging. The large amount of their time is spent at Bruce Head. Using a calf versus adult ratio, the only way to do this effectively is to use a drone video from Bruce Head or the visual aerial survey program (from photos). We've modified the aerial so that we have focused /dedicated survey lengths that we drop down to 1000 ft and we would normally do these at 2000 ft but will come back down at 1000 ft so that we can come back and look at the ratios. What you're trying to get at is a representative data set.

PA: Part of the appeal of Bruce Head is the height and distance from the vessel to monitor the animals.

PR: re. Sample size. There are other locations that you're high up, but from tagging, there are hardly any animals. Tremblay is good but there is no shipping there. So it's a combination of the pathway of concern, adequate number of animals, and your vantage point - we've looked everywhere.

AMH- I appreciate the limitations that this presents. I think it's well documented. One issue from the MHTO are impacts to mammals entering the area when animals have already made their way through. I'm going to park that. I do want to make a note, Marianne Marcoux is not on the call, I've made note before, but the development of EWIs requires input and expertise from others. It's unfair to not allow the observers (i.e., Josh Jones), to comment. If there are people on the line with expertise, I ask that you speak up so that we can hear the comments.

EM: Running those floe edge aerial survey at the start of shipping season provide additional information on avoidance during sensitive times. One benefit when we were developing these offline and switching toward the behavioural EWIs is the fact that it better compliments and aligns with IQ and what we have heard from community members. In terms of the local expertise that we've been provided and what has been shared with us in the past, we will better integrate the information that is being shared today with what we've heard. This is an opportunity for looking at new approaches. Further discussion needs to happen on the EWI approach.

EM: NIRB has been pushing BIM with EWIs for the project in its recent recommendations; we are mindful of the push from MEWG and other bodies. Even in the scientific community there is limited literature on what are early warning signs. The delay in our submission aligns with an overall delay in science. It's likely why we haven't received any concrete feedback from the MEWG. I had asked offline from DFO (MM) what is used for triggers by DFO. I am still waiting for responses on this. I appreciate the urgency, but we're a step ahead of everyone else, but still behind. Because the NIRB is pushing us on this, we will be moving forward to submitting our approach to NIRB. We're trying to be collaborative and meet our requirements. Following implementation of our programs this summer, and revising our modeling, we will be able to further refine that with the working group moving forward.

AS: I did get comments to the entirety of the group. The major points that MM wanted to make is that we would appreciate a draft of the EWIs in order to review it in a useful and comprehensive way. I understand that Baffinland will be submitted this to the NIRB in case they don't open up to parties for comment.

AMH: Am I hearing that by providing a draft that this may result in a delay of submission. I just want to make sure that we have an open process.

EM: I'm not sure of the NIRB's intention or whether they would open up for comment, or just provide to the NIRB in terms of the overall assessment of the annual terms and conditions. Happy to speak further with Cory on the path forward. I will take the latter approach and will provide an update when I share the list of references. **(ACTION M-25062020-8)**

JJ: Question on the Bruce Head Shore-based Monitoring Program – Connecting EWIs with response data can be challenging, in order to do that a number of factors exist, how long would the disturbance be? Do we have duration of response data from Bruce Head and what are those? Are there limitations to collecting?

PR: Yes. However, in some cases, we don't have a duration, but it's based on the distance at which we saw a response, and then how quickly the animal goes back to normal behaviour based on ship traveling in set speed. We feel like there could be more done, thus why we're following more on the focal follow. It's still in design. We will finalize over the next week or so. We're also in discussions with JASCO on how to tie the modeling into the response variables. It's nice to know it was known at this distance, but what do you think was the distance, and amount of time before it goes back. The tagging data is the best for that. If we could run both programs going forward, we would have a good set of tools, but it is contingent on tagging programs and what it would mean for Baffinland's involvement.

JJ: With regard to the duration of behaviours. If you have the opportunity to see the animals return to the normal behaviour. Without good duration of response data, it will be very difficult to situate the behaviour to a severity scale. This leads me to another concern. We have a commitment to a research program in Eclipse Sound. We've done some monitoring independently. Feels like a supplement to the acoustic data that you've collected. You're introducing variability to your programs from year to year. We will continue to do monitoring and we will be expanding to an extent. We would like to be working with Inuit associations and plug this into the Inuit monitoring programs. The results, whether we provide support, or other locally-generated data. Can they be plugged in to see if the thresholds have been reached and whether these can be plugged into integrate other programs into the mitigation measures? If other triggers have been met as identified through separate programs, can they be considered?

EM: The first question on the work done by Oceans North. I had exchanged an email with Amanda Joynt, I had indicated that we would be interested in hearing further about the report once it's available. My understanding is that the MHTO has seen parts of this report. With regard to community-based monitoring and how it's integrated into Baffinland's adaptive management approach. Essentially the results of community-based monitoring is shared with both the QIA and Baffinland and our forward looking vision is that the results from both community and our results will be reviewed holistically by an Inuit committee that is tasked to reviewing those and if there are discrepancies, these may provide input into adaptive management measures. There is a process there. The commitment to providing funds to a community driven program. This is a new program and there is further work to be done by QIA and the MHTO to push that forward.

EM: There were a couple of requests regarding the email I sent through on the additional references on icebreaking and current operations, and approach and format for observer participation. With regard to indicating that we would like to take a revised approach to the observer participation. In light of the Amendment PC 183, we want to be very mindful of completing meeting agendas, seeking feedback from regulators and key groups such as the MHTO and QIA who have oversight on the Project. At a minimum, our compliance objectives need to be achieved. From PCa's (JB's) email on the consensus working group. We're not trying to run an authoritarian meeting, that is not the objective. If we provide an agenda and we receive no request to add new topics, then we need to stick to the agenda. We've been very open to setting up additional discussion. I've opened up to Oceans North to open up the discussion on their presentation for results. This will continue to be a priority for Baffinland.

AJ: To be productive I feel it is important to have discussions. Keeping observers to the end will be disjointed. I was disappointed with your email. I am going to ask questions as they come up and not wait to the end of the meeting; please provide all material one week in advance of the meeting.

EM: The mandate and priority of the observer role is primarily to listen to discussions. I do appreciate your feedback. If observers have questions they want covered in the meeting, they can provide the details in advance of the meeting.

AJ: I think it's up to the MEWG members, and the others will need to chime in on this. As a civil society, we have a duty.

JB: Perhaps a lot of these items could be parked. When we work on revising the terms and conditions, in terms of better use of time, better incorporation of comments. I don't want to cut off the conversation but I do think we can have a more fulsome discussion and I think it is extremely valuable to our group.

EM: I will take see if there is a better way to define the terms of an observer.



AHM: I feel there is value hearing from all parties, other meetings run by NIRB are in a roundtable format and everyone has an opportunity to talk. Please be careful about creating a new format, everyone should have an opportunity to speak to this.

EM: I will provide some written feedback and a possible balanced approach. I will issue a revised draft and work to make that happen, we will have a separate call as needed.

**\*\*\*ACTIONS\*\*\***

7. Baffinland to share with MEWG the various references included in Golder's EWI presentation shared during MEWG meeting.
8. Baffinland will confirm timing of EWI submission with the NIRB.

**Additional Agenda Item: Questions on Ice Breaking Material**

EM: NIRB members have offered to speak to any MEWG members who may have any additional questions.

AHM: There were two (2) items from your email that were not currently in the registry, however Solomon indicated he would ensure it was posted by the end of the day.

JH: 2020 monitoring plans work - Patrick talked about photos being taken at two altitudes at Bruce Head. Is there any chance the updates and finalized designs could be sent to the group?

PA: We can provide a summary of all the changes as part of future reporting (**M-25062020-9**).

**\*\*\*ACTIONS\*\*\***

9. Golder/Baffinland to provide a summary document to the MEWG members of all the changes implemented during the 2020 Bruce Head field program as part of future reporting.

END

Tables that follow provide summary: of i) action items from current; and ii) status update on action items from past February 25, 2020 meeting.

**Table 1. Summary of action items update from June 25 and July 10, 2020 MEWG Meeting**

#	Action Item	Action By	Status Update
1	Baffinland to provide tentative schedule for the ToR amendment process	Baffinland	<b>In progress.</b> GN distributed a draft version to MEWG members for comment on March 9, 2020. Comments were by various agencies by April 17, 2020. Baffinland provided an updated version (May 7, 2020) and these were discussed during a follow-up working sessions on May 8, 2020. Subsequently, Baffinland submitted to the NIRB on October 16, 2020 an updated version and this included consideration of all feedback received during the various working sessions and comment review periods. Additional comments were shared with the MEWG by email on December 10, 2020, on behalf of

			the Government of Canada (DFO, ECCC and PCa), and by the GN on December 11, 2020.
2	<b>Baffinland</b> to notify to the Working Group that the Shipping Report has been submitted to the NIRB.	Baffinland	<b>Completed.</b> Baffinland submitted to the NIRB the Shipping report on July 17, 2020, in advance of the start of the first vessels making their way into the RSA.
3	<b>Golder</b> to connect with DFO (Kim Howland) as needed to discuss sampling plan logistics.	Baffinland/Golder	<b>Completed.</b> No additional input was required on 2020 logistics.
4	<b>DFO (KH)</b> to share literature on eDNA with Golder/Baffinland.	DFO (KH)	<b>Completed.</b> DFO shared 8 publications on eDNA for consideration by Baffinland: <ul style="list-style-type: none"> <li>• Baillie et al. 2019. Environmental DNA and its applications to Fisheries and Oceans Canada: National needs and priorities.</li> <li>• Goldberg et al. 2016. Critical considerations for the application of environmental DNA methods to detect aquatic species.</li> <li>• Leduc et al. 2019. Comparing eDNA metabarcoding and species collection for documenting metazoan biodiversity.</li> <li>• Pochon et al. 2017. Wanted dead or alive? Using metabarcoding of environmental DNA and RNA to distinguish living assemblages for biosecurity applications.</li> <li>• Rey et al. 2020. Considerations for metabarcoding-based port biological baseline surveys aimed at marine nonindigenous species monitoring and risk assessments.</li> <li>• Ruppert et al. 2019. Past, present, and future perspectives of environmental DNA (eDNA) metabarcoding: A systematic review in methods, monitoring, and applications of global eDNA.</li> <li>• van den Heuvel-Greve et al. 2021. Early detection of marine non-indigenous species on Svalbard by DNA metabarcoding of sediment.</li> <li>• Zaiko et al. 2018. Advantages and Limitations of Environmental DNA/RNA Tools for Marine Biosecurity: Management and Surveillance of Non-indigenous Species.</li> </ul>
5.	<b>Golder</b> to connect with DFO (Marianne Marcoux) as needed to further discuss 2020 aerial survey timeline.	Golder/DFO (MM)	<b>Completed.</b> After review of logistics associated with travel into and out of Mary River Mine site, no additional discussions were required.

6	<b>Baffinland</b> to explore possibility of obtaining field-based ice condition data from MSV Botnica when transiting through ice and to share this with the MEWG.	Baffinland	<b>In progress.</b> Baffinland will include available ice information through 2020 annual reporting efforts, and may share as part of future MEWG meeting examples of daily ice conditions provided by ice analysts.
7	<b>Baffinland</b> to share with MEWG the various references included in Golder's EWI presentation shared during MEWG meeting	Baffinland	<b>Completed.</b> EWI memo was submitted to the NIRB on August 20, 2020 (NIRB Doc. No. 331325) and includes the list of references).
8	<b>Baffinland</b> will confirm timing of EWI submission with the NIRB	Baffinland	<b>Completed.</b> Baffinland submitted to the NIRB the EWI document on August 21, 2020.
9	<b>Golder</b> will provide a summary of modifications to the monitoring program as part of future reporting	Golder/Baffinland	<b>In progress.</b> Baffinland to include any new updates as part of 2020 reporting efforts.

**Table 2. Summary of action items update from February 25, 2020 MEWG Meeting**

#	Action Item	Action By	Status Update
1	<b>GN</b> to distribute to MEWG members the latest draft of ToR showing track changes.	Government of Nunavut	<b>Completed.</b> GN distributed a draft version to MEWG members for comment on March 9, 2020. Comments were by various agencies by April 17, 2020. Baffinland provided an updated version (May 7, 2020) and these were discussed during a follow-up working session on May 8, 2020. Subsequently, Baffinland submitted to the NIRB on October 16, 2020 an updated version and this included consideration of all feedback received during the various working sessions and comment review periods.
2	<b>DFO</b> to review availability of long-term datasets that may help to support selection of adequate EWI(s) relevant to the Project	Fisheries and Oceans Canada	<b>In progress.</b> Baffinland requested dataset in January 2021 however DFO has indicated that they cannot provide any data associated with samples for cortisol levels in narwhal. DFO is continuing to look into what long-term datasets exist, but more discussion with the MEWG is required in order to identify and select any additional EWIs.
3	<b>Baffinland/Golder</b> will provide an EWI "What we Heard" summary document to MEWG members to comment.	Baffinland/Golder	<b>Completed.</b> Baffinland submitted to the NIRB on August 21, 2020 a memo, Early Warning Indicators for Marine Mammals, which provided a summary of feedback received by the MEWG and others for the consideration of variables for suitable EWI
4	<b>MEWG</b> to provide feedback to Baffinland/Golder on EWI summary document.	All	<b>Completed.</b> Dependent on completion of Action No. 3 to proceed.
5	<b>Baffinland</b> to organize a dedicated teleconference call to	Baffinland	<b>Completed.</b> Dependent on completion of Action No. 4 to proceed. Dedicated session

	further discuss selection of EWI(s) based on feedback received from Action No. 4.		was organized for June 25, 2020 and continued on July 11, 2020.
7	<b>Golder/Baffinland</b> to provide calculations for coefficients of variation for abundance estimates in 2019 aerial survey report.	Golder/Baffinland	<b>Completed.</b> Request will be included in 2019 Draft Aerial Survey Report.
8	<b>Baffinland</b> to schedule a teleconference for week of March 2, 2020 to resume discussion of outstanding agenda items.	Baffinland/All	<b>Completed.</b> Teleconference was scheduled on March 5, 2020.
9	<b>Golder/Baffinland</b> to further discuss with <b>DFO</b> sampling methods/sample processing during benthic grabs.	Golder/Baffinland/DFO	<b>Completed.</b> Sampling methods/sample processing during benthic grabs were discussed during June 2020 MEWG meeting.
11	<b>Golder/Baffinland</b> to include power analysis results using the newly added sampling sites and will clearly indicate in report figures new and historical sites.	Golder/Baffinland	<b>Completed.</b> Request will be included in 2019 Draft MEEMP Report.
12	<b>DFO</b> to connect Golder with DFO Arctic char aging specialist	DFO	<b>In progress.</b> DFO shared recent publication by DFO Canadian Scientific Advisory Secretariat from March 2021 (Gallagher et al. 2021) on Arctic Char aging with Baffinland. Publication subsequently shared with the MEWG for reference. If the need is still required, DFO to provide contact information for specialist. <u>Reference:</u> Gallagher, C.P., Wastle, R.J., and Howland, K.L. 2021. Evaluating otolith preparation methods for anadromous Arctic Char: establishing an age estimation protocol and comparing historical with contemporary data. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/023. iv + 29 p.
13	<b>Golder/Baffinland</b> to include sampling frequency as part of 2019 MEEMP/Aquatic Invasive Species reporting	Golder/Baffinland	<b>Completed.</b> Request will be included in 2019 Draft MEEMP Report.
14	<b>MEWG</b> members to provide comments on past draft meeting minutes by March 13, 2020.	All	<b>Completed.</b> No comments received during comment period by any MEWG member.
15	<b>Baffinland</b> to plan for next upcoming in-person meeting to be held likely sometime in June 2020	Baffinland	<b>Completed.</b> In light of COVID-19 travel and work restrictions over the entire year, in-person meetings will not be possible.

Name: Chris Spencer

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Agency / Organization: Qikiqtani Inuit Association

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Date of Comment Submission: 12 April 2021

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#	Document Name	Section Reference	Comment	Baffinland Response
1	A.1 June 25 2020 MEWG Meeting No. 22 Minutes _Draft	General	It is QIA's expectation that draft MEWG minutes be provided to participants in a timely manner (i.e., 2-3 weeks), to allow for effective review. Any delays in submission of draft minutes should be clearly communicated to all Working Group members so that technical experts can adjust schedules as needed. These draft minutes for the June 2020 MEWG conference call have been provided ca. 10 months post-meeting. Due to the lateness of the submission of these draft minutes, and other priorities, QIA will not be submitting detailed review comments. We recommend that the Proponent make all possible efforts for timely submission, and clearly communicate any anticipated delays in doing so.	<p>Thank you for your comment. Baffinland acknowledges that these minutes were provided later than usual and will make best efforts in the future to distribute draft minutes to obtain feedback from the TEWG in a timelier manner.</p> <p>It is noted that since March 2020, Baffinland has faced numerous challenges related to the global COVID-19 pandemic, which as of April 2021, is still ongoing. Accordingly, this has resulted in the reprioritization of certain activities in order to ensure the health and safety, including the wellbeing, of its employees and contractors, who have had to constantly adapt to changing conditions. Activities such as coordinating and completing environmental effects monitoring programs safely rather than cancelling programs in the context of a global pandemic required greater time and effort during implementation, and accordingly such activities were prioritized over others due to their importance. Furthermore, as can be seen in the action tracker, Baffinland placed greater value on completing actions identified during these</p>

#	Document Name	Section Reference	Comment	Baffinland Response
				<p>meetings, and accordingly was able to demonstrate progress towards these actions. Baffinland notes that it did not receive any request from the working group members asking when these would be made available.</p> <p>As part of its 2020 annual reporting efforts to the NIRB, Baffinland will be providing a summary of the challenges it faced related to the COVID-19 pandemic, and the solutions that were implemented in order to continue operating responsibly during a global pandemic.</p>



Name: Jacquie Bastick

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Agency / Organization: Parks Canada

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Date of Comment Submission: Tuesday April 6, 2021

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#	Document Name	Section Reference	Comment	Baffinland Response
1	Applicable to both minutes from June 25, 2020 meeting (action item #1, Table 1) and Dec 9, 2020 meeting (action item 1, Table 2)	See info under "document name" heading	Please change status of this action item to "In progress" and add that as per the email from Allison Stoddart at Parks Canada dated December 10, 2020 the GoC provided comments to Baffinland regarding the Working Group Terms of Reference (ToR) that was provided by Baffinland to the NIRB on October 16, 2020.	Comment is noted and change has been reflected in the meeting minutes.

Name: Alexandra Sorckoff

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Agency / Organization: Fisheries and Oceans Canada (DFO)

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Date of Comment Submission: Wednesday, April 28, 2021 (comments received via email)

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#	Document Name	Section Reference	Comment	Baffinland Response
1	June 25, 2020 meeting minutes (Action item #4, Table 1)		<p>Via Email: In regards to Action Item #4 from the June 25 and July 10, 2020 MEWG Meetings, DFO is attaching the following eight papers for your reference:</p> <p><u>References:</u></p> <ul style="list-style-type: none"> <li>• Baillie et al. 2019. Environmental DNA and its applications to Fisheries and Oceans Canada: National needs and priorities.</li> <li>• Goldberg et al. 2016. Critical considerations for the application of environmental DNA methods to detect aquatic species.</li> <li>• Leduc et al. 2019. Comparing eDNA metabarcoding and species collection for documenting metazoan biodiversity.</li> <li>• Pochon et al. 2017. Wanted dead or alive? Using metabarcoding of environmental DNA and RNA to distinguish living assemblages for biosecurity applications.</li> <li>• Rey et al. 2020. Considerations for metabarcoding-based port biological baseline surveys aimed at marine nonindigenous species monitoring and risk assessments.</li> </ul>	Comment is noted and change has been reflected in the action tracker in both June and December meeting minutes.

#	Document Name	Section Reference	Comment	Baffinland Response
			<ul style="list-style-type: none"> <li>• Ruppert et al. 2019. Past, present, and future perspectives of environmental DNA (eDNA) metabarcoding: A systematic review in methods, monitoring, and applications of global eDNA.</li> <li>• van den Heuvel-Greve et al. 2021. Early detection of marine non-indigenous species on Svalbard by DNA metabarcoding of sediment.</li> <li>• Zaiko et al. 2018. Advantages and Limitations of Environmental DNA/RNA Tools for Marine Biosecurity: Management and Surveillance of Non-indigenous Species.</li> </ul>	
2	June 25, 2020 meeting minutes (Action item #2, Table 2 from February 25, 2020)	See info under "document name" heading	Via Email: In regards to Action Item #2 from the February 25, 2020 MEWG Meeting, DFO is continuing to look into what long-term datasets exist, but more discussion with the MEWG is required in order to identify and select any additional EWI's.	Comment is noted and change has been reflected in the action tracker in both June and December meeting minutes.
3	June 25, 2020 meeting minutes (Action item #12, Table 2 from February 25, 2020)		<p>Via Email: In regards to Action Item #12 from the February 25, 2020 MEWG Meeting, DFO is attaching the following paper for your reference:</p> <ul style="list-style-type: none"> <li>• Gallagher et al. 2021. Evaluating otolith preparation methods for anadromous Arctic Char: establishing an age estimation protocol and comparing historical with contemporary data.</li> </ul>	Comment is noted and change has been reflected in the action tracker in both June and December meeting minutes.

## **Marine Environment Working Group (MEWG) Draft Meeting 23 Minutes**

### **Dates:**

December 9, 2020

2:00 pm – 5:00 pm (EST)

From a **Computer (PC/Mac)** or a **Smartphone/Tablet (iOS-Android)**, click the following link:

<https://cms.baffinland.com/invited.sf?id=064701805&secret=3rqNSk7iCgrsfVLhdlwrOg>

**\*\*Use Google Chrome to access CISCO Meeting online**

From a **phone**, dial +14168142855, and enter the meeting ID (064701805)

<b>Member Organization</b>	<b>Participants</b>	<b>Member Organization</b>	<b>Participants</b>
Baffinland Iron Mines Corporation (Baffinland)	Lou Kamermans (LK) – (n)	Makivik	Gregor Gilbert (GG2) – (n)
	Emma Malcolm (EM)- (y)	Mittimatalik Hunters and Trappers Organization (MHTO)	Amanda Hanson Main (AHM) – (y)
	Genevieve Morinville (GM) – (y)		Eric Ootoovak (EO) – (y)
	Krista Johnson (KJ)		
	Steven Douville (SD)		
	Connor Devereaux (CD)		
	Kyle Emslie (KE)		
Qikiqtani Inuit Association (QIA) and Consultants	Chris Spencer (CS) – (y)	<b>Observer Organization</b>	<b>Participants</b>
	Bruce Stewart (BS) – (y)		
	Jeff Higdon (JH) – (y)	World Wildlife Fund – Canada (WWF)	Andrew Dumbille (AD) – (y)
Fisheries and Oceans Canada (DFO)	Kim Howland (KH) – (y)		Brandon Laforest (BL) – (n)
	Alexandra Sorckoff (AS) – (y)		
	Marianne Marcoux (MM) – (y)		
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG) – (y)	Oceans North Canada (Oceans North)	Amanda Joynt (AJ) – (y)
	Anna Graham (AG) – (y)		Josh Jones (JJ) Scripps Institute – (y)
	Krupesh Patel (KP) – (y)		
Government of Nunavut (GN)	Brad Pirie (BP) – (y)	Nunavut Impact Review Board (NIRB)	Solomon Amuno (SA) – (n)
	Natalie O’Grady - (n)	Canadian Northern Economic Development Agency (CANNOR)	Cory Barker (CB) – (y)
			Arusa Shafi (AS2) – (y)
Parks Canada (PCa)	Allison Stoddart (AS) – (y)	<b>Baffinland Consultants</b>	<b>Participants</b>
	Chantal Vis (CV) – (y)	Golder	Patrick Abgrall (PA) – (y)
	Jacque Bastick (JB) – (y)		Phil Rouget (PR) – (y)
			Marina Winterbottom (MW) – (y)

		Raine Sharpe (RS) – (y)
		Elaine Irving (EI) – (y)
		Ainslie Allen (AA) – (y)
		Mitch Firman (MF) – (y)
		Tannis Thomas (TT)
		Julia Horgan (JH)
	JASCO	Melanie Austin (MA) – (y)
	EDI	Mike Settingington (MS) – (y)

## Agenda

Time	Activity
2:00pm – 2:10pm	Welcome and Rollcall
2:10pm – 3:00pm	EWI Technical Memo Submission Summary
3:00pm – 3:15pm	Baffinland Update <ul style="list-style-type: none"> <li>2020 Shipping Season Summary</li> </ul>
3:15pm – 4:00pm	2020 Monitoring Program Update
4:00pm – 4:45pm	2019 Monitoring Report Comment and Response Summary
4:45pm – 5:00pm	Roundtable and Action Item Review

Discussion and Comments
<i>Baffinland welcomes all participants from member and observer organizations. Slight change in agenda to accommodate member's availability.</i>
<b>EWI Technical Memo Submission Summary</b> <i>Relevant to Project Certificate Conditions 110, 112</i>
<u>Early Warning Indicators - Slide 2</u> PA: Reviewing Early Warning Indicators (EWIs). Process that was outlined in the memo submitted, and looking at assessment for candidate EWIs, they were taken off initial list proposed by Fisheries and Oceans Canada (DFO). And through consultation with the MHTO we have identified 3 potential indicators of interest. We looked at those and cross-referenced them. We looked at site access – ease of accessing collection of data; the cost of information; and support from the MHTO. From this process as you can see, it became clear that a variation in calving rates is the most logical indicator as an EWI. Through information that was available, looking at the proportion of immature individuals makes sense in terms of providing useful indicators to changes in population of calves and yearlings. PA: In terms of marine monitoring programs (MMPs) to collect EWI data, it would happen through Bruce Head.
<u>Threshold – slide 3</u> PA: This is the proportion of immature narwhals. 2014 is baseline year, the lowest value we had was in 2014 which was 15.2 percent of individuals being immature narwhal. If we decreased that by 10% we arrive at threshold of 13.7%. It is important to point out here that we are correcting this value from what was presented in Table 5 of section 3.1 in the

Technical Memo submitted on August, 20 2020 (NIRB Doc. No. 331325), there was an error in the tabulation of values. The numbers were incorrectly summarized in the table – this table is accurate.

Methods – slide 4

PA: Methodology used to collect information. During the field program at Bruce Head, the observer were doing counts. We count all animals in groups passing by the study area (do not double count reintroduction). With regard to marine mammals, it is possible that animals dive into water and come back up and move around – we can lose track. There is a risk that animals are being recounted. However, when a known re-sighting occurred it is being excluded.

Example – slide 5

PA: Example of what observers see from the platform. 1 in 6 individuals would fall into the calving category.

Alternate Monitoring – Aerial Photography – slide 6

PA: We talked about looking at the potential of collecting aerial photography to see if it could support the EWI process for identifying immature individuals back during our February 2020 meeting. Our aerial program is at 1000 feet – you can see a big difference in resolution between 1000 feet vs. 2000 feet. We did fly a couple of flights to collect data to potentially look at photography to see if it is a useable tool. Such data is going to be looked at to see if it could be used as a supplementary tool.

Alternate Monitoring – Aerial Photography (continued) - slide 7

PA: Potential baseline data existing from aerial surveys. In 2016 there was a photographic survey performed at 2000 feet, which may not be able to provide the level of data we need. In 2019, the photographic surveys were conducted at 2000 feet, but elsewhere it was conducted at 1000 feet.

GM: This is recap of documents sent back in August 2020. Note that we do have additional folks online. Connor Devereaux (CD) and Kyle Emslie (KE) from Mary River have just joined us. As well as Steven Douville (SD) from our Shipping Department.

MM: Very exciting to see work being done on EWIs, and that progress is being made. Going in the right direction. I wonder if you thought about ways to calculate variation around your estimates for establishing the proportion of calves and yearlings?

PA: Are you saying throughout the season? Or year-to-year?

MM: I asked this question before – I am worried about how you compare year-to-year. We would need to know the variation between proportions of calves versus yearlings. Do you have ways to address this?

PA: We aren't doing a statistical analysis. We have taken the pre-Early Revenue Phase (ERP) shipping value, which is 15.2% and allocating a 10% decrease to that value. Although there is variation, we are just using the pre-value that is existing and using a 10% decrease on that. Even if there is variation from year-to-year, we are just setting a threshold benchmark.

MM: You are not doing a statistical test, I get it. I wonder maybe by having some measure of weekly coefficient, proportion may help. We know the 2014 value is an estimate. Trying to get a measure on how confident we are in proportions.

PA: This is just the actual number of proportion of the animals. If we calculate all animals, there is no variation. We could do a daily count and do a variation instead of clumping together.

MM: Something that would show variation around numbers.

PA: We know that proportion can change throughout the year. Maybe what you are getting at is that sometimes the programs aren't run at the same time period, or ice patterns may change through the year which could affect numbers. Perhaps this is something we could look into. What is the benefit of breaking it down by time periods and looking at variations? We have confidence that this number is representative of the population for that year. We have no uncertainty toward that number. Do you have something specific?

MM: It would be helpful to break down variance by day or week. This is the number you observed, but how well does it reflect the actual population?

PA: Yes – there is no variation because that is the site. But we are thinking about possibly running a survey from Koluktoo Bay and Tremblay Sound – this would show some variance in the population by having more than one site. So this is the idea of Bruce Head, but if it gets to a point where aerial survey data gets integrated into this, there's going to be some measure of uncertainty that applies. If you took different regions into it then you'd have variation to account for. I am not sure for Bruce Head itself – we can look at this and see if we can break down to weekly. This is something we will take away and will have discussions about (**ACTION M-09122020-1**).

MM: This is a good segway. DFO ran an aerial survey (i.e., photographic) in 2013 at 1000 feet, and it was photographic/cameras all the time, flew at 1000 feet. This may be something you can have access to if there is interest. But the photos are oblique. In your survey, are they oblique?

PA: This summer the photos were oblique, not straight down.

MM: Are you going to use a drone?

PA: We are trying to use drones to get idea of accuracy is. We are looking into seeing whether a drone will act as a useful tool, and if so, then down the line maybe we can perhaps transition to the use of a drone as a tool.

MM: How are marine observers trained to distinguish between a calf, yearling, or adult? Do you have an idea of accuracy? Maybe the drones are a way to go for training.

PA: In terms of what we use, in the past, this year was different...in the past a team of observers were positioned at the stations (i.e. Inuit observers, biologists), a lot of the information are led by Inuit researchers. I know from early days, Elijah Panipakoocho was an observer, and he stayed on for a number of years. Drones do provide tool for training for cross-referencing. In terms of looking at variation, we are looking at cross-referencing our counts with the use of drones. We can perhaps look at variation in the count.

MM: This is great. If you can build this up and build confidence, that would be great.

MM: Our position is that we would like to see more than one EWI. This would be valuable – to have one that would deal with body condition. At DFO, we do have samples you can use if you decide to go this way. If you partner up with Inuit, that would help as well. I would like to emphasize that we would like at least one more EWI.

GM: We are focusing on this one EWI. PA and others from the Golder team could discuss limitations with using a body condition indicator.

CV: Looking at EWI report, the values are very different from what is presented in this table.

PA: I will first start on MM's point. With regard to other EWIs, I know we have had these discussions and it is not a closed discussion. If we find opportunities to improve we will look at new ways to do so. But we need to use current data to allow us to be compliant with relevant PC Project Certificate (PC) conditions. If new tools or data comes available for us to use, such as body condition data, then we can consider further, but for now our position is that looking at the proportion of calving rate makes sense for narwhal population that uses the area that is of high importance and where we can study this directly. Leaves indicator specific to importance of the area. With regard to the other question on the different values presented in the table showing 10%, what happened in the technical memorandum, in the processing of the master database, the juveniles were still included in the number, and where the error became obvious was during a technical meeting. If go back to slide 3, if you take 10% off of 15.2%, then that takes you to 13.7%, once you remove 1.52%.

CV: Will the technical report or memorandum from 2020, will there be a corrected memo? Was there a corrected memo with revised numbers? Or just here in the slide deck?

PA: Just in the slide deck.

EM: Note we will not be updating the memo because we have the requirement for EWI under our PC condition, we will report on this with the corrected numbers and values for 2020 in our Annual report to the NIRB. You will see those as part of that submission in 2021.

JJ: I have a question on EWI with respect to calving rates. How will the proponent (Baffinland) determine that the change is caused by Project-related activities?



PA: So the question is, how do we know if the impact is Project-related? This is part of the challenge. As I mentioned, one of the reasons for choosing this indicator is because it is an important calving ground for narwhal. It is hard to assess change due to shipping specifically. By monitoring this indicator, this gives us the heads-up if we see change in population, and this can lead us to do adaptive management if needed, helps us to look at variables we are measuring through the other monitoring programs and see what the data may be telling us. This will allow us to be respond should changes be observed.

PR: We want to clarify to everyone on the call that there are numerous variables (indicators) that have been monitored since 2013. This EWI is the only formalized indicator that would trigger specific mitigation action. But all the other indicators, we can look at them to see if there are any correlating changes indicative of changes in calving rate.

PA: EWIs are discussed in terms of conservation biology, but it's not practically applied in Projects across Canada. We are assessing and moving forward with this, but it's not something that a lot of people are looking at. We are working through developing this as we go along in terms of how it applies to the PC and everything relating to it. It is important to understand where this has and has not been used in terms of monitoring programs.

GM: We are presenting you what we are doing, but many organizations may be doing research elsewhere. For us, if we are seeing certain changes, we can see what can potentially be done on our end.

JJ: PR – I heard you say that the EWI, if it is reached it is designed to trigger specific mitigation actions. Can you elaborate on that? What are the specific actions triggers?

PR: Currently, if we are to see a 10% decrease to calving rate, we would flag those with the MEWG and then we would come to an agreement on what mitigation could be implemented to address those issues. This process will become more formalized under the Phase 2 operation scenario. In terms of how to approach it under the ERP, it basically would depend on what we are seeing, and what mitigation tools that are identified by the advisory group that we can use.

JJ: What is the connection currently between the change in calving rate and the monitoring of underwater sound and behaviour?

PA: You are looking to see what we are currently seeing?

JJ: I'm looking for framework to determine, should you observe a change in behaviour or a level of noise that is of concern, leading to change in calving rate.

EM: As you will note and outlined in the memo, there is an adaptive management section that outlines what would happen if that threshold would be reached, we could explore doing additional monitoring to see if the change is attributed to operations. Ultimately, what would occur if we hit the threshold, we would go back and look at previous datasets and seek out a relationship to see if it exists, and PA mentioned this, if we were seeing a change in calving rate at Bruce Head, our first response would be to use additional datasets to conduct a detailed investigation. This is always going to be our first step in better understanding potential effects.

GM: We are building datasets with each year. This is why we are focused on collecting various types of data through our various monitoring programs.

CS: I appreciate the discussion going on. It is unclear if based on what was just said if Baffinland would be able to establish if the Project is impacting narwhal, that is would the company be able to conclusively establish a link using its current available data? This wasn't clear to me. And if it is the case that Baffinland cannot, what additional data would be required and why isn't it being collected right now?

EM: The question is, would Baffinland with its current datasets be able to establish a causal link to a change in proportion of calves? Is this your question?

CS: Yes. You said you won't evaluate the concept until an EWI is triggered.

EM: This is why we are not exclusively looking at data with respect to the proportion of calves as a specific indicator. We have a lot of data. If we were to see that change when we process the data, we would also be able to identify if there are other warning bells going off in terms of behavioural response. We would be able to identify quite quickly to identify triggers that would lead to such change. Having said that, there is a certain level of uncertainty with this. I am

not sure how many meetings you have been a part of, but this has been part of discussion with this working group for several years as this is a novel approach. GM also mentioned this – why we rely on other parties to collect relevant data in the area, so we have an understanding of whether other changes are occurring or if there are other changes affecting the narwhal population - we can look at datasets and try to discriminate Project-related effects from non-Project-related changes. We are actively doing it. We are not waiting for a threshold. This is part of our ongoing data collection.

GM: In terms of impact assessments, this involves a process that identifies potential effects based on the information available from multiple sources. From this assessment, we identify multiple layers of protection in order to avoid or minimize to the extent possible potential effects (i.e., through implementation of mitigation and management measures). These layers of protective measures are based on best practice, professional experience, etc., and aim to minimize and/or avoid potential effects. This is what we are doing right now. Based on identified potential effects, we have implemented multiple measures and are monitoring various components of the marine environment to see if the measures being implemented are effective or whether we are able to identify Project-related effects. We have to see this as a living and constantly evolving process.

CS: Based upon what I heard today, it's not clear if the adaptive management process is flushed out. I'm curious to know exactly what we could expect in terms of response time if we do hit a trigger. How long would you go through the data evaluation process?

EM: It would depend on what we were seeing in the data. For example, if we saw a change in the proportion of calves but no other warning bells in other datasets, it could possibly trigger a need to look at other datasets to see if this change was occurring elsewhere i.e., not Project-specific). But we could also see if there is an immediate response that could be taken by the company, regardless of the causal nature of the observed change. QIA should understand that we are working with them on formalizing the adaptive management process. I don't think there is a need to discuss this further right now. There are several examples we have provided where we have implemented adaptive management measures. I can recirculate this material if you want. But we are circling theoretical situations right now, and potentially being redundant knowing there is a path forward with QIA on approving our adaptive management approach.

#### \*\*\*ACTIONS\*\*\*

1. **Baffinland/Golder** to consider the potential for estimating calving rate variance by exploring potential to calculate rates on a weekly basis.

#### Baffinland Update

#### 2020 Shipping Season Summary

##### 2020 Shipping Communications – slide 4

GM: Prior to commencing our shipping season we have procedures in place to inform communities of our upcoming shipping season. As part of our approach prior to shipping, we get confirmation that the floe edge is closed by the MHTO.

##### Ice Conditions prior to Shipping – slide 5

GM: We have ice analysts that look at satellite imagery and ice concentrations released by the Canadian Ice Service. This is an ongoing process to ensure we meet commitments related to ice including avoiding the breaking of landfast ice.

##### Day 1 of Shipping – slide 6

GM: The first set of vessels transiting into the Regional Study Area (RSA) towards Milne Port arrived as a convoy consisting of the MSV Botnica, 2 ore carriers and two tugs.

Ice Conditions – slide 7

GM: By the end of July 29 there were relatively open water conditions throughout the shipping lane, with the exception of a small area that was 3/10 ice. There were some interesting ice conditions in 2020 where thick ice conditions remained near Bylot Island and Ragged Island, almost like a plug, thus we were in a one transit per 24 hours scenario until there was almost no more ice along the entire shipping lane until late August.

Ice Conditions – slide 8

GM: Ice conditions at the end of the shipping season remained below 6/10.

2020 Shipping Season Highlights – slide 9

GM: We had 72 ore carriers that came through, with the first transit consisting of a convoy, as indicated previously. And the last set of vessels also consisted of a convoy. We maintained throughout the shipping season a waiting area for vessels that was located at least 40 km to the east of the Nunavut Settlement Area. We had a total 8 resupply and fuel vessels combined – 4 cargo and 4 fuel tankers – calling to Milne Port. Throughout the season, we were able to monitor vessel speeds (9 knots) and continued to monitor vessels to ensure they remained within the defined shipping lane. Deviations were followed up with Vessel Masters. Despite COVID-19 challenges, we continued our ballast water compliance testing, and followed our standard operating procedures (SOPs) as described in our Ballast Water Management Plan.

BS: Was there any biological testing on ballast water?

GM: No biological testing was possible due to boarding restrictions.

JH: How will vessel exceedances compare to previous years?

GM: We haven't worked out all of the data. Details will be provided in the 2020 Annual report to the NIRB.

PR: It is too early for us to say. We have all of the Automatic Identification System (AIS) data, and we have to QA/QC it. It will be available in the 2020 Annual Report to the NIRB.

GM: One of the things the shipping monitors do as part of their role is to track daily vessel activity, and look at the vessel speeds and vessel locations. They are able to access the ExactEarth software and are writing notes throughout the day in order to inform the community of latest vessel positions. They are also tracking and recording non-Baffinland vessels if they transit through the RSA.

EO: I have a question about page slide 9 – how many transits did the icebreaker (MSV Botnica) make in the 2020 shipping season?

SD: I can get it fairly quickly.

JJ: I know the traffic of icebreaker isn't uniform along northern shipping route. When you answer the question about the number of transits it would be helpful to know where specifically along the route you are measuring from.

GM: This year, the way the ice conditions presented themselves, The MSV Botnica was escorting vessels and/or transiting through the RSA only once every 24 hours for the early shipping season since there was ice greater than 6/10 that remained along the shipping lane until late July.

JJ: Was that 24-hour cycle implemented through all periods of operation of the icebreaker? Or during shoulder season only?

GM: It was implemented during the early shoulder season when we had ice conditions that were greater than 6/10 ice. If there is any ice that is more than this ratio, then this is what defines the 24-hour clock. When the icebreaker is not needed it is anchored at Milne Port.

JJ: We also want the total number of transits of the MSV Botnica through the entire region.

GM: There were a few more in the summer for vessel crew changes – we can get you specific numbers and dates (**ACTION M-09122020-2**).

SD: For escorts, we escorted approximately 25 vessels in and out, but I will have to confirm how many transits this included. In 2020, we ensured that the Botnica went out to release its grey water every 10 days. I need to add this in to

the number of transits. There was also a crew change. We will come back with a more fulsome answer ((**ACTION M-09122020-2**)).

JJ: 25 in and 25 out? So at one one point along shipping route we will see icebreaker 50 times?

EM: We will pull the numbers together for an action item (**ACTION M-09122020-02**).

JH: Not sure if I understood correctly. During ice conditions, I'm looking for a clarification. During ice conditions of 6/10 of ice and greater, and the limitations per 24 hours, was it in and out within the same 24-hour period, or in for 24-hour period and then out during the next 24-hour period?

GM: A ship has to wait until 24 hours is reached before another vessel can travel again through the RSA over the next 24 hours. At a high level, it takes almost 20 hours to get from one end of the RSA to the other along the shipping lane.

**\*\*\*ACTIONS\*\*\***

2. **Baffinland** to share with the MHTO the number of transits the MSV Botnica made during the 2020 shipping season.

**2020 Marine Monitoring Program Update**

*Relevant to Project Certificate Conditions 1, 76, 83, 83(a), 87, 89, 91, 99, 113, 114, and 126*

*Golder presents a summary of proposed programs from the 2020 field season*

2020 MEEMP and AIS Program – slide 2

PA: For this program, it started on July 21 and ended on September 15 2020. In terms of the MEEMP, field crews arrived on July 21 and left on Sept 15. In terms of MEEMP, we were able to successfully complete water quality sampling, sediment and benthic infauna, fish and fish habitat, and fish tissue sampling. With regard to Aquatic Invasive Species (AIS), it was successfully completed as well. I know there are a few questions on the 2019 AIS program, and we will save that for the next session when we talk about the 2019 monitoring reports. With regard to the marine fish habitat offset program, this was the final year of the ore dock program, and year 1 of the freight dock monitoring. Physical oceanography data was also collected.

Marine Mammal Aerial Survey Program – slide 3

PA: The pre-season survey occurred from the 10-22 of July. The goal is to survey open-water at the floe edge east of Pond Inlet. The second time the aircraft were on site was for the summer abundance survey which included a survey of Eclipse Sound and Admiralty Inlet. We were able to complete two full surveys on these grids. One advantage we had was by having both aircrafts for the abundance surveys staged from Mary River. We had the opportunity to survey each grid with two aircrafts at a time. Last year when we did the survey in two days, each aircraft surveyed the different locations on different days. Hopefully the 2020 data provides a better indicator on numbers in the area since we were able to complete surveying all the grids in the same day. The end of season clearance survey did not take place this year.

2020 Bruce Head Shore-based Monitoring Program – slide 4

PA: The program occurred August 7-30 (observation period). The ability to come in and out of the Mary River Mine Site was limited this year due to COVID-19. Data collection was conducted the same way as it was in 2019 and data collected on behaviour and shipping activity was collected using the same grids.

2020 Bruce Head Shore-based Monitoring Program – slide 5

PA: This slide shows cropped images of groups of narwhal. Notably we were able to complete 108 focal follow surveys.

2020 Passive Acoustic Monitoring Program – slide 6

PA: Both the North Milne Inlet and Eclipse Sound acoustic recorders that were deployed in 2019 were meant to be retrieved this year. But due to logistical issues they weren't able to be retrieved in early summer 2019, and instead

were retrieved on Sept 5, 2020. The good news is that the batteries surpassed conservative expectations and both retrievers were able to record over that entire period. The Bruce Head recorder was deployed on August 1, 2020, and it was retrieved on September 6, 2020.

Incidental Marine Mammals Sightings Pilot Program - slide 7

GM: The Ship-based Observer Program is one program we were not able to complete as done in 2018 and 2019 due to COVID-19 boarding restrictions. In response, we had to come up with an alternative plan which was to set up a pilot program to that could provide incidental observations. As you know with the SBO program, we have typically deployed local Inuit observers, most from Pond Inlet, but were unable to do so this year. We started communicating our interest for the need for observations through a collaboration with an external organization, the Marine Mammal Observation Network (MMON), which has been typically more active in the St. Lawrence region. With the support of MMON, we encouraged selected vessel owners to have their ship crews record marine mammal observations. We were happy to enter into agreement with MMON, and accordingly signed an agreement in summer 2020 in order to adopt their data collection protocols. With the help of Green Marine and MMON, a virtual training session was held with representatives of selected vessel owners. Data collection protocols were provided to participating vessels. Vessel crews were able to collect data throughout the summer from July to October using the MMON data collection protocol.

Incidental Marine Mammals Sightings Pilot Program – slide 8

GM: This is a screenshot of draft observations. These draft sightings have been compiled from July to October, 2020. This is simply to show how much information was received. It is definitely not as detailed as the SBO program, but at least we are able to get vessels to become aware that this is of interest to us and that we are looking at expanding this program. This is a good start and we will be considering this expansion to other vessel companies as well. Overall it was successful for increasing general awareness of vessel owners.

AJ: I have a question about the drone program. In terms of the focal follows, how is the duration determined? Until narwhal exhibit pre-disturbance behaviour? How long did they last?

PA: This is determined either by either losing track of animals because of diving, or the battery duration of the drone (i.e., ~20 min).

AJ: Would you say the average was about 20 min?

PA: This would be the maximum because we still needed to get to the pre-determined selected location and to wait for narwhal group to go through the area.

AJ: It would be good to see in the reporting whether there was a lot of return to pre-disturbance behaviour within those 20 minutes. Is this possible?

PA: We will have to look at data. Part of what we are going to look at is to see if this is in fact a useful tool.

GM: Maybe it would be helpful to capture the imagery we were able to obtain during the program. This was a success.

PA: One of the other benefits from the drone program was with respect to focal follows.

EO: With respect to aerial surveys by airplane. I'm wondering if Golder has assessed the impact of airplanes on narwhal behaviour. This is a question regarding aerial surveys. While the airplane is flying above the animals, how much impact is it causing on the animals? **(ACTION M-09122020-3)**

PA: The question was whether we are recording the reaction of animals?

GM: Were any drone captures made during the marine mammal aerial surveys?

PA: By the airplane, the animals typically don't react to airplanes, but if they do, we would record this.

EO: The reason I ask this is because airplane noise can have impact on animals, along with all the ship noise. You may notice that there is even more impact to animals. This should be further looked at (i.e. cumulative impact – noise from airplanes and vessels). We have seen a lot of impact of airplanes on animals.

PA: Thank you. It is another activity that happens but a critical activity that needs to occur in terms of being able to assess abundance of marine mammals in area. What we're hoping is that in a normal year when we can discuss reports

in person, we would come to Pond Inlet and present them, and ideally have observers on the plane with us (Inuit researchers on the team), and they could provide us this type of information as well on how they observed reactions of animals to aircrafts.

AHM: I want to clarify with EO, I believe what he was talking about was monitoring underwater noise of narwhal? Is Baffinland noting or monitoring at all underwater noise or responses of narwhal while airplanes are being flown?

EO: This was my first question that was unanswered. When airplanes are flying above, what are the impacts felt under water?

PR: We are typically flying at 1000 feet or 2000 feet when running into higher density of animals we are at higher altitude. When you are dealing with in-air noise travelling into another medium like water, the sound loses punch when going into a new medium. So typically you don't have a lot of transference of noise. We have acoustic recorders in the water and we can correlate that to when the plane transits were crossings, and we should be able to pick it up on the recorder if it is audible (**ACTION M-09122020-3**). We also have concurrent visual data from visual observers when flights were passing over a portion of the RSA near Bruce Head. We don't have drone data taken at the same time as those taken via same time as aircraft, but we would be able to pick up on overt behavioural responses by animals as planes would have transferred through area.

EO: I have seen several video recordings when airplane flies by at 500 feet. I suggest planes avoid camps where hunters are. The hunters have complained about this – airplanes are scaring narwhal.

PA: Our aerial surveys are done at 1000 feet so we don't fly at 500 feet. It is possible hunters observed another aircraft in the area. If we had dates and times on when this occurred, we could cross-reference with where our team was. It would be good to know if we could cross-reference. Don't know if MM is still on the call – have you done studies in terms of noise propagation of air surveys and how it transmits into water?

MM: We don't have specific studies on this – noise of plane while doing survey. But the 1000 feet is chosen for minimizing impact on whales and maximizing how much observers can see. This is a standard altitude. To confirm, the altitude Golder flies at is the same as DFO, but it doesn't mean that it is always perfect. Golder has a very nice set-up with having an observer on the group when doing survey.

GM: I have taken note of this and we can further talk about it.

PR: EO – Can you clarify if you're talking about drones or aircrafts? If issue is with drones, then this is a different conversation.

EO: I am talking about airplanes. Drones have minimal impacts on animals. But certain animals do get impacted.

EO: I will try to gather video from community on these incidents (**ACTION M-09122020-4**).

JJ: I think that it may help to answer questions if concurrently if getting ready to have future decision if JASCO could compile examples of airplane fly-overs and of their seafloor acoustic recordings. If those are ready for people to look at the time of the next conversation, that would be helpful.

GM: We do try to plan before we meet with MHTO.

JJ: We can try to provide such information before next meeting if Baffinland cannot do this.

GM: I will speak to Golder on what is available to us.

JJ: Part of the questions would be, when are those airplanes passing by, when are they recorded, and what is the underwater noise level?

PR: I need to talk to JASCO about what is available. We do have the same understanding on what is needed. (**ACTION M-09122020-3**)

GM: Input from having Inuit researchers on our programs is something we are looking forward to having again once COVID-19 restrictions are lifted.

JG: Can you expand on why the clearance survey didn't occur and what advice was provided by DFO and the MHTO?

GM: What we did is I sent an email to the MHTO, and we had our crews at mine site to do clearance survey on standby, and when I sent email to notify the MHTO of our intentions to run a clearance survey, it was indicated that it wouldn't



be worthwhile to do it (via EO) given there wasn't a lot of ice in the area. DFO agreed with this too. Since the MHTO indicated it was not needed, we elected to not move forward with the clearance surveys based on their advice.  
EO: Yes – this is what we did. No more feedback.

**\*\*\*ACTIONS\*\*\***

3. **Baffinland/Golder/JASCO** to review existing acoustic dataset to see if (i) sound from airplanes are detected by sound recorders; and (ii) if any narwhal behaviour data has been recorded in response to aircraft. Data to be subsequently shared with the MEWG during future meeting.
4. **MHTO** to see if video is available by residents in the community showing narwhal behaviour in response to aircraft.

**2019 Monitoring Report Comment and Response Summary**

*Reference to tracker file: A.1 MEWG Comment Follow Up for Meeting.xlsx*

PA: Row 2 – we summarized key comments that came in which warrant some discussion. First one is from QIA – what indicators are being monitored for each marine mammal Valued Ecosystem Component (VEC)? Can you provide more information? I am not sure if we are missing something.

JH: I thought it was pretty clear. You responded to the MHTO, and in your response noted that monitoring programs currently taking place for each marine mammal VEC. This is not the case for polar bears. What programs are being run for each of the VECs?

PR: There is only one marine mammal VEC– they are a VEC, and indicator species fall under the VEC. There is a number of programs we run which all have indicators in them. Those details are outlined in each of the programs. For the sake of the question, I will go through it quickly. We do acoustic monitoring throughout the shoulder season and open-water season, we are monitoring underwater noise for all receptor species. We look at potential for ship strikes, etc. ,through the Ship-based Observer (SBO) Program. Bruce Head focuses on narwhal looking at behaviour, abundance, etc. We've had a tagging program that focuses on narwhal because it's the key species (as identified through the environmental assessment process). Finally, we have completed aerial surveys during the summer shoulder season, which focuses on mostly whales but they do pick up ringed seal and different seal species in area. The indicators for that program would be relative abundance to true abundance to distribution, and behaviour when recordable.

JH: What programs are being undertaken for polar bears, and what indicators are being used?

PR: When we developed programs, they were focused on key issues identified and where there is uncertainty. For polar bears, because we're operating in a certain season, we focus our programs and effort on species that we need to (key ones). We don't have species-specific programs, but sightings are recorded through the SBO program. The SBO program would be one of the ones where polar bears would be picked up as part of the program, with the indicator of relative abundance. Nothing on underwater acoustics on polar bear, and the Bruce Head program would collect information on polar bears in area. It seems like there may be an underlying question out there. Can you ask it?

JH: Looking at Baffinland's response to MHTO 1, and statement on comprehensive monitoring programs that if polar bears were identified as a VEC, and it was carried through the EA process, there should presumably be indicators in place that are monitoring for polar bears.

PR: Marine mammal is the VEC. Marine habitat, and fish health are also Marine VECs.

Jeff: Are you saying polar bears are terrestrial?

PR: No. I am not saying that. They are a marine species. The statement you read out is correct as written.

PR: I can only speak to marine and that is what we are talking about today. It is not incorrect as written.

EM: It sounds like it is a hang-up on the language. We covered the topic relative to this WG. Phil has provided a robust response. I suggest we move on.

PA: Row 3 – to summarize this, it referred to monitoring seals and responses indicating that aerial surveys would be used and have been used, and the question also refers to how to do we make surveys assess density of seals in area? To clarify, yes seals are recorded as part of marine mammal aerial survey programs, it is not a great tool to assess and estimate abundance. We do record them, and the way we record them is through presenting detection rates.

PA: In the last part, I was indicating is what we can do in terms of presenting...we already present sightings during aerial surveys, and linear km of observation, we can present those from 2020 as well.



JH: I will not add anything here. Will speak further with the MHTO about this.

PA: Row 4 – With respect to 4, we are unsure. What is the issue with respect to our monitoring programs? What is the concern in this case?

JH: Our concern that critical life cycle periods are not being addressed with respect to what BIM sees as critical vs not critical. What evidence you have to suggest that the spring moulting period is not a critical life cycle period? Why is it not critical?

PR: Maybe a wording issue as well. To me, based on literature, for marine mammals that are in the marine world are associated with a life cycle –birth, growth, reproduction and death. The question here is why is moulting not a critical lifecycle phase? You need to look at what the critical concern looks like, and then take into consideration if animals are impacted during this period, and then if you would observe changes to an animal's normal behaviour that would in turn affect the population. If it is not going to have implications on either of those metrics it wouldn't fall under critical stage. The answer to this, is that it doesn't appear to represent a critical life stage as it doesn't overlap with pupping, mating, or nursing, and not expecting mortality in that time of year as animals are in water at that time of year. This is well documented in the literature. With respect to Inuit Qaujumatugangit (IQ) relating to this, I am not aware that in any of the data presented in existing IQ reports, that moulting is being flagged as critical to Inuit. Can you identify any information stating otherwise?

CS: I think it is important to understand that although QIA has knowledge to share, a lot of these topics should be investigated by Baffinland and we can always assist with supporting transfer of knowledge. These questions should be posed to affected communities.

EM: The QIA owns all IQ for the Project and has been involved in the design. I think there is a probably good awareness of QIA's perspective of what IQ is available. If there is a specific issue in terms of the monitoring programs, this is what we are looking for.

GM: Are there any questions for us to discuss here? What are the key questions we can go through very quickly?

MW: Row 5 – the comment relates to whether we were able to increase the number of settlement baskets in Milne Port for 2020. Yes, we were able to – we deployed 45 baskets around the freight dock. Previous to this, there was a total of 9 baskets. We intended to deploy more but limited to supplier issues. In 2021, we hope to deploy additional baskets.

RS: For row 6 – it took a bit of digging, this one is referring to a previous question, and the reframing of the question I couldn't put things together. The original question was asking about the power of the analysis to detect change in condition relative to sample size, etc. The response that condition in previous reports was referring to are fish in good shape to Fulton's condition factor...this follow-up question asked how does condition connect to statistical power of tissue sampling. There has been a misunderstanding to say that fish condition doesn't interact directly to fish tissue...there are multiple lines of evidence that said that. At the end of the day the power analyses for statistical analyses for future programs in Marine Monitoring Plan in terms of tissue chemistry, we plan on doing a power analysis as part of 2020 annual reporting with data from 2020.

BS: I am fine with your answer. Thank you.

GM – For rows 7 and 8. I'm not too clear what you are asking here.

BS: This is condition specific, the program should be capable of detecting responses ahead of ship...does Baffinland feel it's meeting this PC condition?

GM: We implement a variety of different programs. The SBO is one way to assess this type of question related to vessel strikes. We have the Bruce Head survey, and we have done tagging surveys that are separate from SBO that adds additional context. What are you expecting here? Perhaps this is a separate conversation we should be having.

PR: the spirit of this condition was that a drone program would be feasible. This was tested out, and we have entertained in follow-up...but the technology doesn't allow it because of issues with operating drones on moving target, as well as home range issues. Baffinland is not in compliance with how it's written, but that's because it is impossible to run a drone program ahead of a ship.

JH: Will your 2020 reporting link monitoring to vessels? Are you planning to report how you can link the Bruce Head Shore-based Monitoring Program...will 2020 link drone data to the vessel close point of approach (CPA) at different CPAs? Will reporting make those linkages?

PR: Yes. We will be making linkages for vessel narwhal interactions. This ties to AJ's question posed earlier – Trying to understand timing of animals in terms of focal follows. What we tried to do is, similar to tagging event, we collect as much data...what you can say statistically with a total of 10 or 15 vessel interaction events during focal follows.

CV: Can we set up another time to further discuss?

EM: We can...but this likely won't happen until at least March. But we can park it.

EM: We will try to be brief.

EM: Row 8. Essentially the question was that in June when you did the presentation on EWI, we presented the use of behavioural responses related to EWI. QIA posed question if we are still considering this. The short answer is yes we are looking to behavioural response indicators as an EWI for the Project, but at this point we don't have anything that can be shared as it is still under review between parties.

EM: Row 9. This was answered with MM.

EM: Row 10. This question was posed around how many Project-related vessels were in the RSA in 2013. I did go back and I believe there were 9 cargo vessels and 3 fuel tankers that delivered to the site in 2013 as part of our construction phase for the Project.

PA: Row 11 was relevant to aerial surveys.

PA: Row 13. Request a status update on independent verifications. We have received results from Université Laval. So our team is reviewing those and we will be incorporating the list of specimens into the 2020 MEEMP report.

KH: you were talking about sending a species to a third lab?

MW: Yes, Biologica will be recommending a specialist.

MW: Row 14. Relates to the ship hull fouling and standardization of effort. Effort was not standardized. The amount time spent to survey a ship depends on various aspects such as detection of fouling. At that point, the Remotely operated Vehicle (ROV) was directed to investigate and take closer look...with regards to the question on depths, we measured at several depths.

KH: Going forward, I'm wondering if there will be more effort to standardize? Going forward, if you are to look at questions as to whether certain ships from certain areas have greater or lesser amounts of fouling, or more prone to fouling, it is important to standardize if possible and to know where there has been a lack of fouling as well to understand your level of risk. Going forward it would be good to discuss how to improve that so that the data can be useful.

MW: We touched based on this in a commitment. Happy to continue those conversations.

KH: It's important to make clear as to whether it's standardized or not.

MW: Row 15. Collection of plankton at regular intervals to capture variability. The short answer is plankton are not a monitoring indicator for MEEMP as they are susceptible to variability driven by environmental factors. The extent to which they are incorporated into monitoring is part of Non-indigenous Specie (NIS)/AIS monitoring program. Any other info presented on plankton is to supplement that. There is also a comment on net size. The 64 micron net was wrong size – used accidentally. We usually use a 250 micron net.

KH: I don't think that was clear in the response. If anyone goes and reads it, it doesn't really make sense. It says the opposite of what you told me. We can maybe talk about that offline. Can you go back and change things in the report?

MW: We are capturing this error in the minutes. I think an explanation was provided when we responded to your initial comments, which was appended to the 2019 report.

KIM: The explanation wasn't what you just told me.

GM: These minutes will be appended to the annual report.

Kim: The zooplankton sampling, looking for new species having more than one sample in a season...you are going to pick up a lot of species if you space out your sampling a bit. There is plenty of research showing that doing fewer sampling will give result in more diversity.

GM: We have the safety balance to look at. The time we have to sample safely needs to be considered and it is limited.

KH: Looking at redistributing effort I guess.

MW: Thank you.

MW: Row 16. I spoke to this earlier where effort was not standardized by time. We agreed to take this conversation offline and continue the productive conversation we have had around ship hull biofouling surveys. **(ACTION M-09122020-5)**

KH: Hopefully through those there will be more attention to what is out there in the literature and there is careful thought put in to how much time is required on each vessel.

MW: Row 17. This has to do with opportunistic specimen collection during dive surveys. They were conducted as part of freight dock offsetting habitat. There is no diving occurring near ore carriers whatsoever. This is one of the metrics

we are tracking for species diversity. Due to visibility if our team cannot identify a species in the field, they may try to collect it and bring it back to a lab to identify it.

KH: This is more about the environmental sampling in the environment as opposed to being better able to identify what the ROV is seeing on the vessel. The comment was a bit misleading.

GM: Obviously a lot of this work is to identify gaps in existing species databases for the arctic.

PA: row 9. What is being requested is for Bruce Head to provide averages through the years on numbers of narwhal and provide an estimate of the variability. Those narwhal moving out of Eclipse Sound are moving into Admiralty Inlet. Essentially our goal is to overlap as much as possible.

AJ: I'm going to suggest...a majority of our questions...suggest if there are smaller answers to our other questions that we can go through those and then do other topics in writing and share with the group.

PR: Row 18. Does Baffinland have measurement of sound pressure levels. Yes. We do have those data and these will be put in the technical memo. This answer also ties to row 19. That includes plots of all narwhal vessel interactions.

AJ: You said 9 kn, not 10?

PR: Yes. This will be explained in the memo.

JJ: When will draft acoustic technical memo be ready?

PR: This is going to require back and forth with Baffinland and JASCO. Can't confirm dates right now.

JJ: Will this be before the Phase 2 hearing?

EM: We don't have a date to share.

JJ: The 120 dB zone...is that going to be the measured 120 dB by hydrophones, or modelled zones?

PR: Derived based on source levels of individual transits of ships.

JJ: From source level estimates, then using sound propagation modelling to extrapolate distance of 120 dB?

MA: Based off measured range for ships involved in interactions.

MA: 20. Asking about proportion of vessel transits that are single. The short answer is I don't have that info right now. It can't be extracted easily from acoustic data – will be through analysis of the Automatic Identification System (AIS) data. We can look at doing this in the future. I suspect the answer to this is spatially dependent. I would imagine in the middle of the shipping lane you'd have more occurrences. Wondering where specifically you wanted to know the info and if you are looking for entire shipping period or looking at acoustic recorder locations?

JJ: I'm interested in the measurements of received sound levels from ships and concurrent distance to ships at the time. What is important is the actual measurements and received levels.

MA: Yes. And so that analysis is what we are working on, and focuses on times we have for individual ships. So we don't have every single transit because if there were other ships in area we excluded data in analyses. Don't have now the proportion for how many we kept versus how many exist. This can be worked out over time.

MA: Row 21. Relates to differences in received sound levels at different parts of shipping route. Shallow water propagation versus deep water propagation. Focused acoustics to Milne Inlet area for most part, we focused on Milne due to proximity to Koluktoo Bay, and because this is where Bruce Head monitoring is occurring. We acknowledge there is a potential gap there where we may not be collecting data in deep water. Our acoustic modelling has indicated that sound propagation distances are longer in Eclipse Sound.

JJ: 330 metres was deepest so far.

MA: Bylot Island was deepest. Yes it makes comparing our datasets a challenge.

PR: Nothing further to offer on these comments. 2020 reporting efforts will consider comments as noted.

PA: With respect to row 23. There will not be a resubmission in terms of where the information is.

AJ: Will it be anywhere else?

EM: No, we will not revise the report to integrate it. The material has been publically shared.

AJ: I had Bruce Head question. Time frame of vessel audible to animals. Trying to clarify the 22 minutes...is this what we are assuming that behaviour doesn't last past 22 min?

PR: I haven't seen that question. I don't have that info on my fingertips right now. I can get back to you with a response. **(ACTION M-09122020-6)**

JJ: On the row 23 question. The main thrust of this question is there are two types of data you are working with. Question was why you are not including in this statistical analysis the two-dimensional surface movement from the ice breaking period. Why not include those two-dimensional surface movements?

PR: Thanks. I am trying to reach out to our Bruce Head tech lead. Will follow up on this. I know that what you are asking. There is a reason. **(ACTION M-09122020-7)**

GM: Thank you – we are capturing all comments.

**\*\*\*ACTIONS\*\*\***

5. **Baffinland and DFO** to continue conversations related to ship hull biofouling and standardization of effort.
6. **Baffinland/Golder** to provide clarification with regards to the time frame over which the vessel would be audible to the animal.
7. **Baffinland/Golder** to provide explanation to Oceans North with regard to why two-dimensional surface movements from the ice breaking period are not included.

Tables that follow provide summary: of i) action items from current; ii) action items from June 25, 2020/July 10/2020; and iii) status update on action items from past February 25, 2020 meeting.

**Table 1. Summary of action items update from December 9, 2020 MEWG Meeting**

#	Action Item	Action By	Status Update
1	<b>Baffinland/Golder</b> to consider the potential for estimating calving rate variance by exploring potential to calculate rates on a weekly basis.	Baffinland/Golder	<b>In Progress.</b> Methods for EWI monitoring to be discussed further with DFO during 2021 Monitoring Planning Meeting
2	<b>Baffinland</b> to share with the MEWG the number of transits the MSV Botnica made during the 2020 shipping season and dates of travel.	Baffinland	<b>In progress.</b> A total of 27 transits were made by the MSV Botnica in 2020. Baffinland to share with the MEWG the dates on which the MSV Botnica transited through the RSA as part of annual reporting efforts to the NIRB.
3	<b>Baffinland/Golder/JASCO</b> to review existing acoustic dataset to see if (i) sound from airplanes are detected by sound recorders; and (ii) if any narwhal behaviour data has been recorded in response to aircraft. Data to be subsequently shared with the MEWG during future meeting.	Baffinland/Golder/JASCO	<b>In progress.</b> Analysis is underway by JASCO regarding noise from airplanes. No behavioural data recorded from aircraft.
4	<b>MHTO</b> to see if video is available by residents in the community showing narwhal behaviour in response to aircraft.	MHTO	<b>Not Yet Started.</b> MHTO to provide any new updates during review of draft minutes and this will be updated in final minutes.
5	<b>Baffinland and DFO</b> to continue conversations related to ship hull biofouling and standardization of effort.	Baffinland/DFO.	<b>Completed.</b> Commitment finalized via Phase 2 Review process. Refer to DFO 3.6.6.NEW
6	<b>Baffinland/Golder</b> to provide clarification with regards to the	Baffinland/Golder	<b>Completed.</b> Responses provided to ON via email following last MEWG meeting. (Attached for MEWG reference)

	time frame over which the vessel would be audible to the animal.		
7	<b>Baffinland/Golder</b> to provide explanation to Oceans North (ON) with regard to why two-dimensional surface movements from the ice breaking period are not included.	Baffinland/Golder	<b>Completed.</b> Responses provided to ON via email following last MEWG meeting. (Attached for MEWG reference)

**Table 2. Summary of action items update from June 25 and July 10, 2020 MEWG Meeting**

#	Action Item	Action By	Status Update
1	<b>Baffinland</b> to provide tentative schedule for the ToR amendment process	Baffinland	<b>In progress.</b> GN distributed a draft version to MEWG members for comment on March 9, 2020. Comments were by various agencies by April 17, 2020. Baffinland provided an updated version (May 7, 2020) and these were discussed during a follow-up working sessions on May 8, 2020. Subsequently, Baffinland submitted to the NIRB on October 16, 2020 an updated version and this included consideration of all feedback received during the various working sessions and comment review periods. Additional comments were shared with the MEWG by email on December 10, 2020, on behalf of the Government of Canada (DFO, ECCC and PCa), and by the GN on December 11, 2020.
2	<b>Baffinland</b> to notify to the Working Group that the Shipping Report has been submitted to the NIRB.	Baffinland	<b>Completed.</b> Baffinland submitted to the NIRB the Shipping report on July 17, 2020, in advance of the start of the first vessels making their way into the RSA.
3	<b>Golder</b> to connect with DFO (Kim Howland) as needed to discuss sampling plan logistics (offline discussion)	Baffinland/Golder	<b>Completed.</b> No additional input was required on 2020 logistics.
4	<b>DFO (KH)</b> to share literature on eDNA with Baffinland	DFO (KH)	<b>Completed.</b> DFO shared 8 publications on eDNA for consideration by Baffinland: <ul style="list-style-type: none"> <li>• Baillie et al. 2019. Environmental DNA and its applications to Fisheries and Oceans Canada: National needs and priorities.</li> <li>• Goldberg et al. 2016. Critical considerations for the application of environmental DNA methods to detect aquatic species.</li> <li>• Leduc et al. 2019. Comparing eDNA metabarcoding and species collection for documenting metazoan biodiversity.</li> <li>• Pochon et al. 2017. Wanted dead or alive? Using metabarcoding of</li> </ul>

			<p>environmental DNA and RNA to distinguish living assemblages for biosecurity applications.</p> <ul style="list-style-type: none"> <li>• Rey et al. 2020. Considerations for metabarcoding-based port biological baseline surveys aimed at marine nonindigenous species monitoring and risk assessments.</li> <li>• Ruppert et al. 2019. Past, present, and future perspectives of environmental DNA (eDNA) metabarcoding: A systematic review in methods, monitoring, and applications of global eDNA.</li> <li>• van den Heuvel-Greve et al. 2021. Early detection of marine non-indigenous species on Svalbard by DNA metabarcoding of sediment.</li> <li>• Zaiko et al. 2018. Advantages and Limitations of Environmental DNA/RNA Tools for Marine Biosecurity: Management and Surveillance of Non-indigenous Species.</li> </ul>
5.	<b>Golder</b> to connect with DFO (Marianne Marcoux) as needed to further discuss 2020 aerial survey timeline	Golder/DFO (MM)	<b>Completed.</b> After review of logistics associated with travel into and out of Mary River Mine site, no additional discussions were required.
6	<b>Baffinland</b> to explore possibility of obtaining field-based ice condition data from Botnica when transiting through ice and to share this with the MEWG.	Baffinland	<b>In progress.</b> Baffinland will include available ice information through 2020 annual reporting efforts, and may share as part of future MEWG meeting examples of daily ice conditions provided by ice analysts.
7	<b>Baffinland</b> to share with MEWG the various references included in Golder's EWI presentation shared during MEWG meeting	Baffinland	<b>Completed.</b> EWI memo was submitted to the NIRB on August 20, 2020 (NIRB Doc. No. 331325) and includes the list of references).
8	<b>Baffinland</b> will confirm timing of EWI submission with the NIRB	Baffinland	<b>Completed.</b> Baffinland submitted to the NIRB the EWI document on August 21, 2020.
9	<b>Golder</b> will provide a summary of modifications to the monitoring program as part of future reporting	Golder/Baffinland	<b>In progress.</b> Baffinland to include any new updates as part of 2020 reporting efforts.

**Table 3. Summary of action items update from February 25, 2020 MEWG Meeting**

#	Action Item	Action By	Status Update
2	<b>DFO</b> to review availability of long-term datasets that may help to support selection of adequate EWI(s) relevant to the Project	Fisheries and Oceans Canada	<b>In progress.</b> Baffinland requested dataset in January 2021 however DFO has indicated that they cannot provide any data associated with samples for cortisol levels in

			narwhal. DFO is continuing to look into what long-term datasets exist, but more discussion with the MEWG is required in order to identify and select any additional EWIs.
12	<b>DFO</b> to connect Golder with DFO Arctic char aging specialist	DFO	<p><b>In progress.</b> DFO shared recent publication by DFO Canadian Scientific Advisory Secretariat from March 2021 (Gallagher et al. 2021) on Arctic Char aging with Baffinland. Publication subsequently shared with the MEWG for reference. If the need is still required, DFO to provide contact information for specialist.</p> <p><u>Reference:</u>  Gallagher, C.P., Wastle, R.J., and Howland, K.L. 2021. Evaluating otolith preparation methods for anadromous Arctic Char: establishing an age estimation protocol and comparing historical with contemporary data. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/023. iv + 29 p.</p>



Name: Chris Spencer

Agency / Organization: Qikiqtani Inuit Association

Date of Comment Submission: 12 April 2021

#	Document Name	Section Reference	Comment	Baffinland Response
1	A.1 Dec 9 2020 MEWG Meeting No. 23 Minutes _Draft	General	It is QIA's expectation that draft MEWG minutes be provided to participants in a timely manner (i.e., 2-3 weeks), to allow for effective review. Any delays in submission of draft minutes should be clearly communicated to all Working Group members so that technical experts can adjust schedules as needed. These draft minutes for the December 2020 MEWG conference call have been provided ca. 4 months post-meeting. Due to the lateness of the submission of these draft minutes, and other priorities, QIA will not be submitting detailed review comments. We recommend that the Proponent make all possible efforts for timely submission, and clearly communicate any anticipated delays in doing so.	<p>Thank you for your comment. Baffinland acknowledges that these minutes were provided later than usual and will make best efforts in the future to distribute draft minutes to obtain feedback from the TEWG in a timelier manner.</p> <p>It is noted that since March 2020, Baffinland has faced numerous challenges related to the global COVID-19 pandemic, which as of April 2021, is still ongoing. Accordingly, this has resulted in the reprioritization of certain activities in order to ensure the health and safety, including the wellbeing, of its employees and contractors, who have had to constantly adapt to changing conditions. Activities such as coordinating and completing environmental effects monitoring programs safely rather than cancelling programs in the context of a global pandemic required greater time and effort during implementation, and accordingly such activities were prioritized over others due to their importance. Furthermore, as can be seen in the action tracker, Baffinland placed greater value on completing actions identified during these</p>

#	Document Name	Section Reference	Comment	Baffinland Response
				<p>meetings, and accordingly was able to demonstrate progress towards these actions. Baffinland notes that it did not receive any request from the working group members asking when these would be made available.</p> <p>As part of its 2020 annual reporting efforts to the NIRB, Baffinland will be providing a summary of the challenges it faced related to the COVID-19 pandemic, and the solutions that were implemented in order to continue operating responsibly during a global pandemic.</p>

#	Document Name	Section Reference	Comment	Baffinland Response

Name: Jacquie Bastick

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Agency / Organization: Parks Canada

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Date of Comment Submission: Tuesday April 6, 2021

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#	Document Name	Section Reference	Comment	Baffinland Response
1	Applicable to both minutes from June 25, 2020 meeting (Action item #1, Table 1) and Dec 9, 2020 meeting (Action item #1, Table 2)	See info under "document name" heading	Please change status of this action item to "In progress" and add that as per the email from Allison Stoddart at Parks Canada dated December 10, 2020 the GoC provided comments to Baffinland regarding the Working Group Terms of Reference (ToR) that was provided by Baffinland to the NIRB on October 16, 2020.	Comment is noted and change has been reflected in the meeting minutes.

Name: Alexandra Sorckoff

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Agency / Organization: Fisheries and Oceans Canada

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Date of Comment Submission: Wednesday, April 28, 2021 (comments received via email)

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#	Document Name	Section Reference	Comment	Baffinland Response
1	Dec 9, 2020 meeting (action item #4, Table 2 from June 25/July 10, 2020)		<p>In regards to Action Item #4 from the June 25 and July 10, 2020 MEWG Meetings, DFO is attaching the following eight papers for your reference:</p> <p><u>References:</u></p> <ul style="list-style-type: none"> <li>• Baillie et al. 2019. Environmental DNA and its applications to Fisheries and Oceans Canada: National needs and priorities.</li> <li>• Goldberg et al. 2016. Critical considerations for the application of environmental DNA methods to detect aquatic species.</li> <li>• Leduc et al. 2019. Comparing eDNA metabarcoding and species collection for documenting metazoan biodiversity.</li> <li>• Pochon et al. 2017. Wanted dead or alive? Using metabarcoding of environmental DNA and RNA to distinguish living assemblages for biosecurity applications.</li> <li>• Rey et al. 2020. Considerations for metabarcoding-based port biological baseline surveys aimed at marine nonindigenous species monitoring and risk assessments.</li> </ul>	Comment is noted and change has been reflected in the action tracker in both June and December meeting minutes.

#	Document Name	Section Reference	Comment	Baffinland Response
			<ul style="list-style-type: none"> <li>• Ruppert et al. 2019. Past, present, and future perspectives of environmental DNA (eDNA) metabarcoding: A systematic review in methods, monitoring, and applications of global eDNA.</li> <li>• van den Heuvel-Greve et al. 2021. Early detection of marine non-indigenous species on Svalbard by DNA metabarcoding of sediment.</li> <li>• Zaiko et al. 2018. Advantages and Limitations of Environmental DNA/RNA Tools for Marine Biosecurity: Management and Surveillance of Non-indigenous Species.</li> </ul>	
2	Dec 9, 2020 meeting (action item #2, Table 3 from February 25, 2020)	See info under "document name" heading	In regards to Action Item #2 from the February 25, 2020 MEWG Meeting, DFO is continuing to look into what long-term datasets exist, but more discussion with the MEWG is required in order to identify and select any additional EWI's.	Comment is noted and change has been reflected in the action tracker in both June and December meeting minutes.
3	Dec 9, 2020 meeting (action item #12, Table 3 from February 25, 2020)		<p>In regards to Action Item #12 from the February 25, 2020 MEWG Meeting, DFO is attaching the following paper for your reference:</p> <ul style="list-style-type: none"> <li>• Gallagher et al. 2021. Evaluating otolith preparation methods for anadromous Arctic Char: establishing an age estimation protocol and comparing historical with contemporary data.</li> </ul>	C Comment is noted and change has been reflected in the action tracker in both June and December meeting minutes.