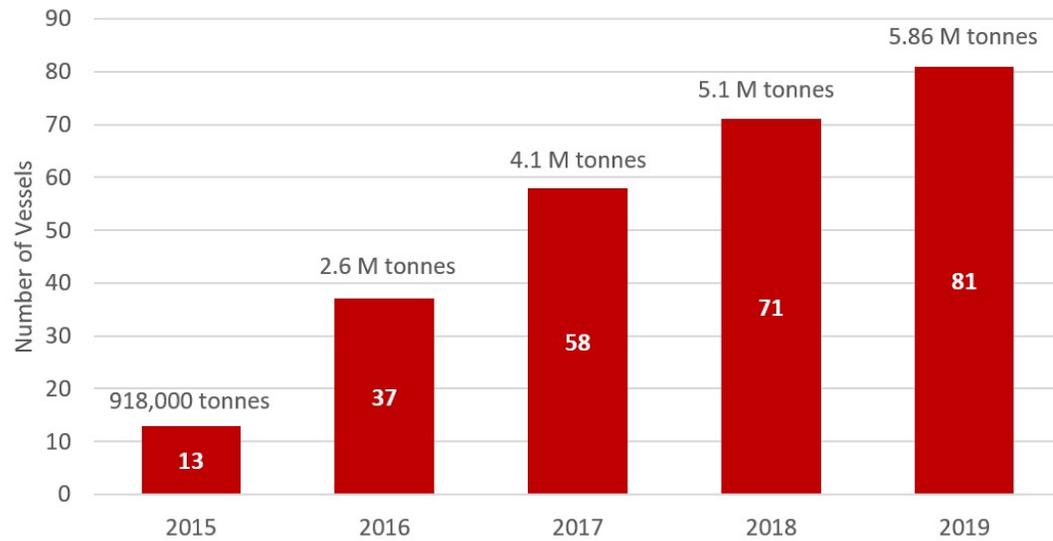




## NIRB Marine Monitoring and Mitigation Workshop – Mary River Project Marine Operational Overview

Pond Inlet – August 25, 2020

# 2015-2019: Number of Ore Carriers and Tonnage by Year



# 2019 Shipping Season Highlights

## Start of Season Conditions

- Operations commenced on July 17 – ice conditions lighter than normal
  - Communication received from MHTO that there is no land-fast ice and hunters no longer using the floe edge
  - Number of transits per 24 h were limited up to July 30th by prevailing ice conditions.
  - +6/10 concentration one transit per 24 hrs; 6/10-3/10 2 transits per 24 hrs; 3/10 or less normal operation.

## Ice Management Vessel

- Botnica escorted vessels for ice mitigation purposes from July 18th to 26th.
- Inuit Marine Wildlife Observers joined Botnica at beginning and end of the season.
- Botnica supported placement/retrieval of acoustic equipment early August/late September/October.
- Bowhead hunt – BIM had Botnica standby in case of on water emergency during hunt.



# 2019 Shipping Season Highlights

## Iron Ore Carrier Vessels

- Loading of ore occurred from July 19 to October 30.
- 82 voyages, or 164 transits through the corridor.
- Approval of application to NIRB ship up to 6 MTPA.
  - Total volume shipped = 5.86 MT (81 vessels)
  - 1 ore carrier sent out for additional ballast water exchange based on salinity < 30 ppt

## Dry Operations Re-Supply/Infrastructure Cargo Vessels

- 9 operations/infrastructure
- 3 heavy sealift

## Wet Re-Supply Cargo Vessels

- 5 voyages throughout the season
- Successful ship-to-ship transfer operations completed



# 2019 Shipping Season Highlights

## Ongoing Management of Vessel Speeds

- Speed monitored for all vessels performing BIM business using Exact Earth.
- All exceedances followed up with Vessel Masters.
- Limited to 9 knots but some exceedances due to vessel control in turning.

## Ongoing Ballast Water Management

- Golden Pearl sent out to Lancaster Sound to re-exchange ballast early August due to failure of ballast water test.

## Routing in Shipping Corridor

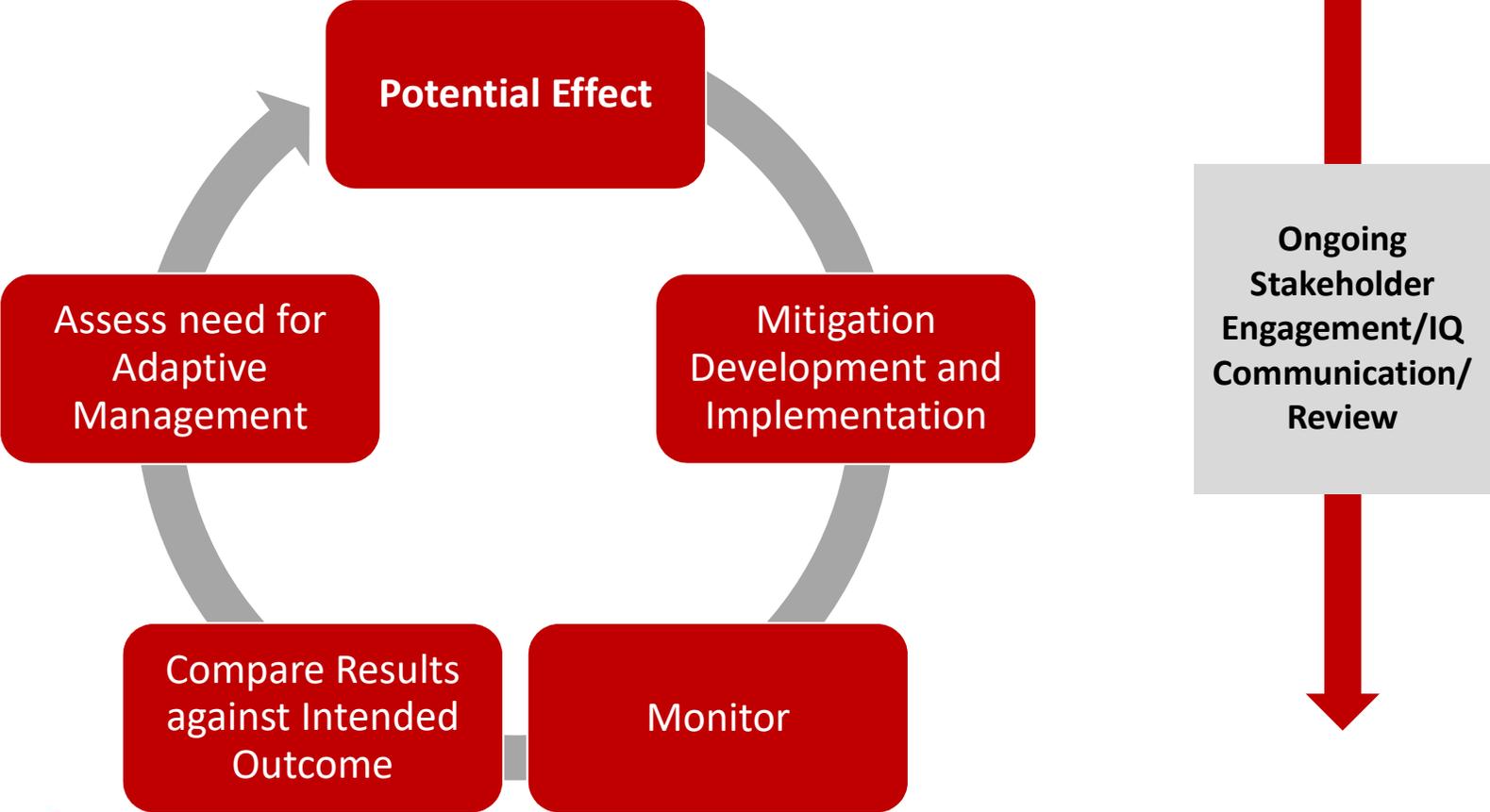
- Routing monitored for all vessels performing BIM business.
- All variations followed up with Vessel Masters.
- Variations primarily due to ice, vessel avoidance.
- Some drifting took place in Eclipse due to windstorm on August 23 (vessels left ports/anchorages).





# Shipping Management and Mitigation Measures

# Development of Shipping Management and Mitigation Measures



## Shipping Mitigation and Management: Ship Strikes



# Shipping Mitigation and Management: Ship Strikes

- Maximum 9 knot speed restriction for Baffinland-contracted vessels
- Accepted as highly effective mitigation for reducing likelihood of lethal vessel strikes
- Baffinland remains the only operator in Regional Study Area to implement speed restrictions on vessels

Project Vessel Type	% of Travel in the RSA <9 knots	% of Travel in the RSA <10 knots
Ore Carriers	99.3	99.9
Cargo / Freight Vessels	93.6	99.3
Fuel Tankers	98.2	99.4
Tugs	94.5	99.0
MSV Botnica Icebreaker	99.7	99.9
<b>Total Average</b>	<b>97.8</b>	<b>99.2</b>

# Shipping Mitigation and Management: Aquatic Invasive Species

Potential Effect =  
**Aquatic Invasive  
Species**

Reduce Pathways for  
Introduction of  
Aquatic Invasive  
Species

1. Ballast water exchange/treatment
2. Ballast water compliance testing prior to discharge at Milne Port
3. Compliance with all applicable IMO and TC regulations for biofouling
4. Monitor



# Prevention of Aquatic Invasive and Non-native Species: Ballast Water Management

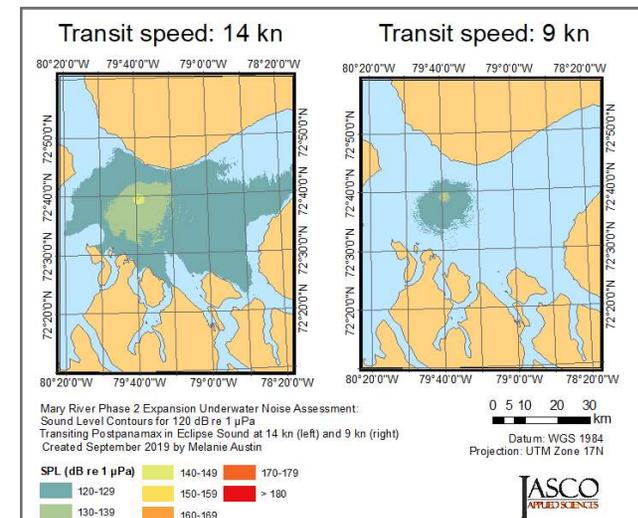
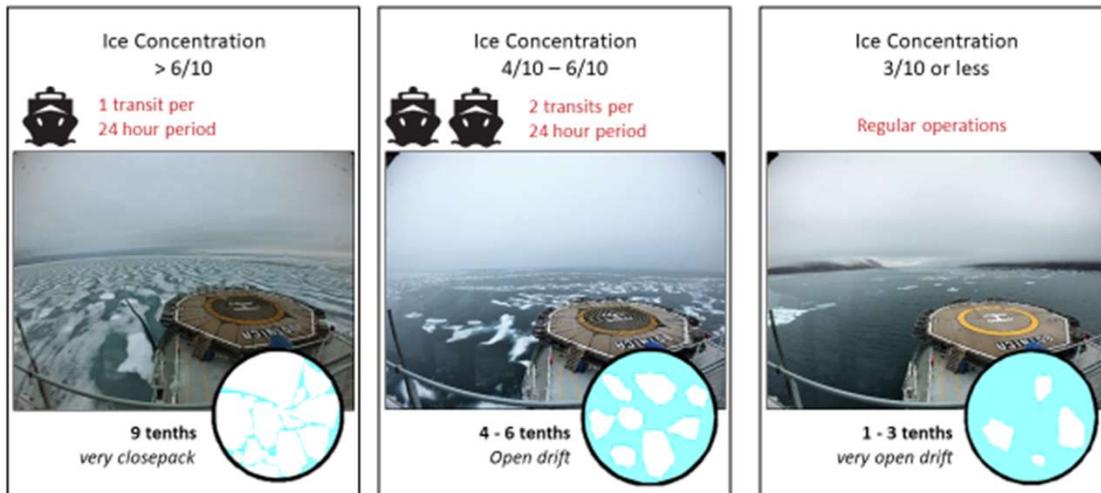
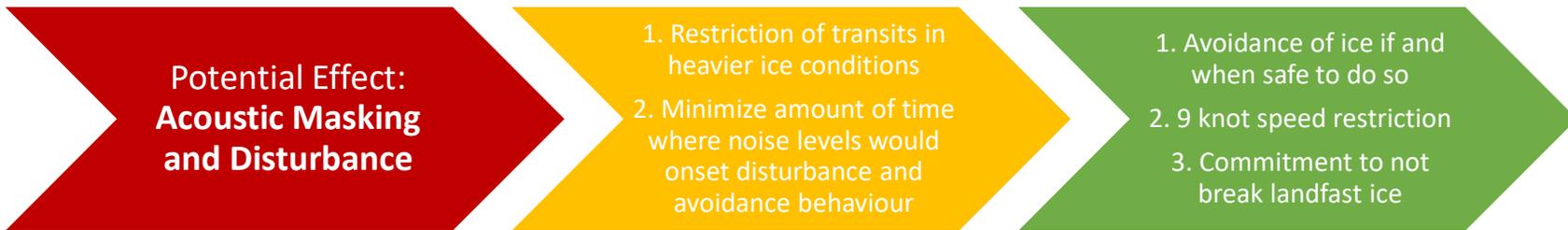
**Transport Canada requires that all foreign vessels on a transoceanic intending to enter Canadian waters must treat water before release or do following:**

1. Conduct a ballast exchange (release all water from ballast tanks; intake water into ballast tanks) at least 200 nm from Canada at a depth of 2,000 m.
2. A Ballast Water Reporting Form must be submitted to Transport Canada after the exercise has been completed.

**Baffinland takes this a step further and goes beyond the Canadian regulations:**

- Every ore carrier that comes into Milne Inlet port has a salinity test performed on a random ballast tank. If the test shows that the salinity level is below 30 parts per thousand (ppt) then the ship is required to head out to Lancaster Sound to perform another exchange (and is re-tested)
- Every ore carrier with onboard treatment system both exchanges and treats water

# Shipping Mitigation and Management: Acoustic Masking and Disturbance





# 2019 Marine Workshop Recommendations

# 2019 Marine Workshop Recommendations -Update

## **Ballast water exchange and concerns around invasive species**

- Ballast Water Management Plan (March 2019)
- Annual monitoring program
- Communicating presence of potential aquatic invasive species

## **Strengthening the Use of Inuit Qaujimagatuqangit**

- Ongoing engagement activities
- Increasing Inuit participation from 2018 to 2019
  - Incorporation of feedback
  - Inuit participant interviews
- Pre- and post-shipping meetings were held in Pond Inlet in 2019 and 2020
- Participation of QIA and MHTO at MEWG meetings
- Inuit participant interviews
- Hiring of shipping monitors



# 2019 Marine Workshop Recommendations – Update

## Vessel Management

- Avoidance of drifting in Eclipse Sound
- Maximum of 3 vessels will anchor at Ragged Island
- Evaluation of alternative anchoring locations
- Ragged Island remains most suitable anchorage location
- Establishment of 40 km buffer zone
- Restricted transits based on ice conditions

## Fish Mortality Events

- Fish mortality events were not reported in either 2019 or in 2020
- Fish sampling is completed in Milne Port as part of annual monitoring programs





# 2019 Marine Terms and Conditions

# What do the Marine Conditions Require us to Study?

## Marine Environment

- What do storms and tides look like in Milne Inlet?
- Are there effects from shipping?
  - How are vessels affecting shoreline and sediment transport?
  - What happens from vessel ballast water exchange?
  - How may water quality be affected?

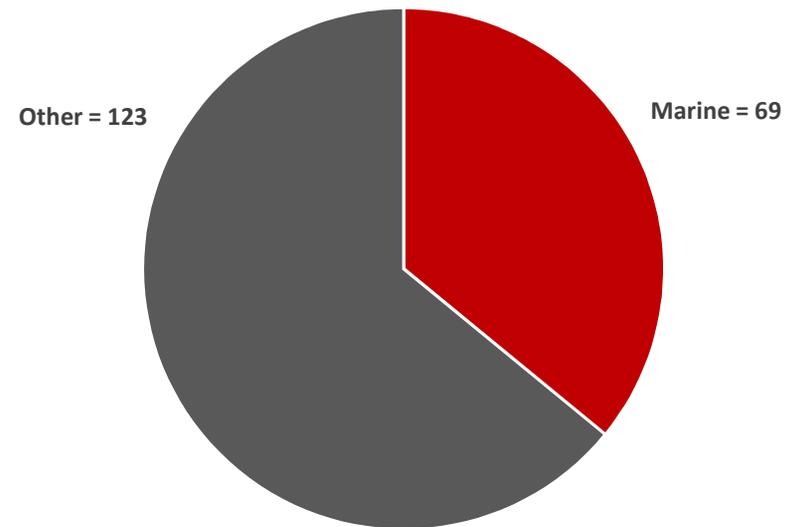
## Marine Wildlife

- When and where are vessels moving and how fast?
- Are there effects from shipping on marine wildlife (e.g., whale, seal, bear) and birds?
  - Where are marine mammals and how many?
  - How does vessel noise and proximity to vessels affect marine wildlife?
  - What and where can birds be seen?
  - Are mitigation/management measures effective?



## Total 184 (+8) Project Terms and Conditions

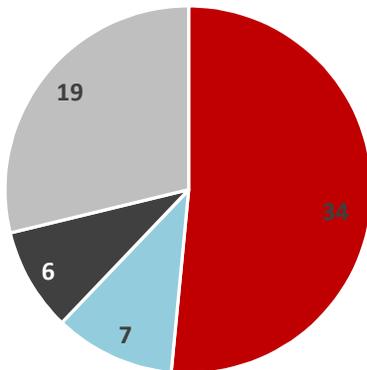
- **Marine = 69/192**
  - Marine Environment
  - Marine Wildlife
  - Process Oversight
- **Other = 123/192**
  - Ecosystemic = 77
  - Socio-Economic = 41
  - Other = 5



Approved Terms and Conditions

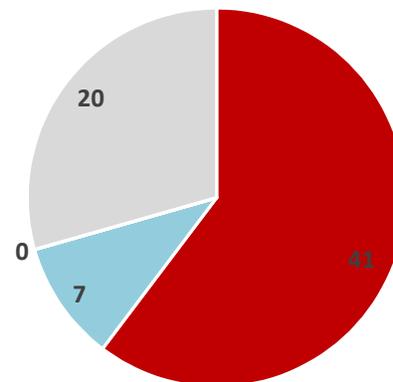
# 2017 to 2019 Marine Conditions – Status of Compliance

2017



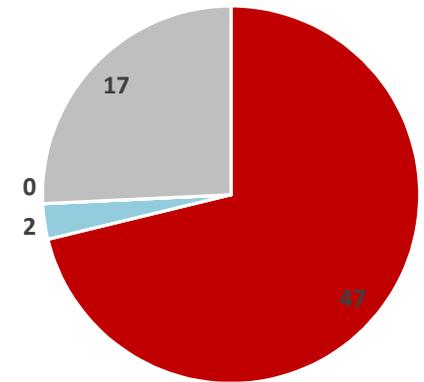
- In-Compliance
- Partially-Compliant
- Non-Compliant
- Not Applicable

2018



- In-Compliance
- Partially-Compliant
- Non-Compliant
- Not Applicable

2019



- In-Compliance
- Partially-Compliant
- Non-Compliant
- Not Applicable



Shipping Season  
Communications

# Overall Shipping Season Communications

- Enhanced communications through the community
- Develop and implement Communications Protocol and provide Baffinland team contact information to community members
  - Pre-shipping season
  - During shipping
  - End of season:
    - Wrap-up meeting
    - Improvements for next year



Learn more about Baffinland's shipping and marine monitoring programs



July 17, 2020  
 His Worship Joshua Arnold  
 Mayor, Municipality of Frobisher Bay

Ms. Erin Cotnam  
 Chairwoman, Inuit Community Relations and Transport Organization

**RE: 2020 May to June 2020 Shipping Season**  
 Dear Your Honors and/or Honorable Members:

Thank you very much for taking the time to meet with Baffinland for the 2020 Pre-Shipping Season Meeting over the telephone on July 16, 2020 to discuss the upcoming shipping season. The 2020 Pre-Season Communications Protocol that was shared on July 15, 2020 summarizes pre-shipment communications protocols that Baffinland has adopted in advance of the start of shipping. Baffinland received a confirmation from the MSV Botnica on July 16, 2020 confirming that the discharge will start on July 21st at 08:00. This letter is being addressed to Baffinland by the MSV regarding the anticipated start date of shipping. By way of this letter, I wish to advise you that Baffinland's 2020 Shipping Season was officially commencing on early on Monday, July 20th when the MSV Botnica arrived. The MSV Botnica will make its first passage into Etah Bay to follow the most direct shipping schedule on the first day of shipping. As stated during the Pre-Shipping Season Meeting, between 70-75 ice carriers are expected to travel to and from Etah Bay (and the Etah Channel). An additional 3 ice carriers and up to 4 fuel tankers will also travel to Etah Bay.

Baffinland will keep you informed on all shipping season updates as they are available. Shipping Monitor has been deployed to the community of Frobisher Bay and will be using a variety of methods including meetings, site visits and other on-site activities to monitor community-related shipping activities. I would like to personally thank you for your efforts to work directly with Baffinland to improve the way we communicate with you and the residents of Etah Bay.

Baffinland will continue to use the same operational practices implemented in 2018 including escorted vessels using the codebook, reduced the travel under frozen ice conditions and will continue the practice of being on-site for the first 24 hours of each of the 2020 shipping season.

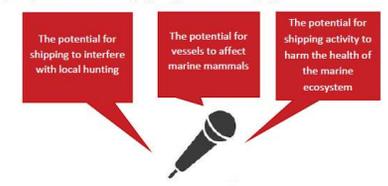
One of the key approaches for successful implementation of improved communications includes the level of pre-shipment meetings held at the Frobisher Bay Baffinland office, with an additional level that will be during the voyage. They will act as the primary liaison between the community of Frobisher Bay, the MSV, and Baffinland to discuss any operational issues related to Baffinland shipping operations. Activities will be ongoing in Frobisher Bay to ensure the greatest degree of transparency available from the land side office, or through a variety of communications through marine staff who deal directly with the MSV. Baffinland will continue to monitor the community of Frobisher Bay and will be supported by Baffinland staff, including the on-duty Shipping Monitor. It is hoped that this increased level of presence will ensure the necessary transparency of the next shipping season with Baffinland over the entire shipping season.

In addition to meeting directly with Shipping Monitors, vessel traffic may be monitored through a variety of methods including:

In 2020, Baffinland will begin its shipping activities as early as July 21. The final shipping schedule will depend on ice conditions (no presence of landfast ice along the entire shipping route) and will continue until approximately October 15. Within this timeframe, we expect there to be approximately 70-75 ice carriers, 3 re-supply voyages and up to 4 fuel tanker voyages. As the season changes, we will keep you updated.

The shipping season is starting mid-July. How are we able to do this?  
 At the beginning and the end of the shipping season, Baffinland has hired an icebreaker vessel, MSV Botnica, to safely escort all other vessels traveling along the Northern Shipping Route.

What you've shared with us  
 Through valuable conversations with local community members, Baffinland has heard a number of primary concerns related to shipping through the Northern Shipping Route.



JULY 2020



# Pre-season and Start of Shipping

1. Provide communities with anticipated shipping schedule
  - Host pre-shipping season meeting (8, 15 July 2020)
  - Distribute Shipping and Marine Monitoring Fact Sheet
  - Provide MHTO with copies of past year monitoring reports
  - No presence of landfast ice along entire Northern Shipping Route
2. Baffinland to contact MHTO to confirm floe edge is no longer being used by hunters at the start of the shipping season
  - Receive confirmation from MHTO to Baffinland in writing via email
  - Start of shipping season letter sent to MHTO and Hamlet in advance of start



**Baffinland**  
Shipping Route

**Questions or concerns?**  
If you are on the water and have an immediate concern, contact our shipping monitor via VHF radio channel 26.  
Visit the Baffinland office and speak with our shipping monitor or view vessel tracks in the Mittimataik Hunters and Trappers Organization (MHTO) building, 2<sup>nd</sup> floor.

**Want to learn more?**  
For shipping updates visit:  
[www.baffinland.com](http://www.baffinland.com)  
> Operation  
> Shipping & Monitoring

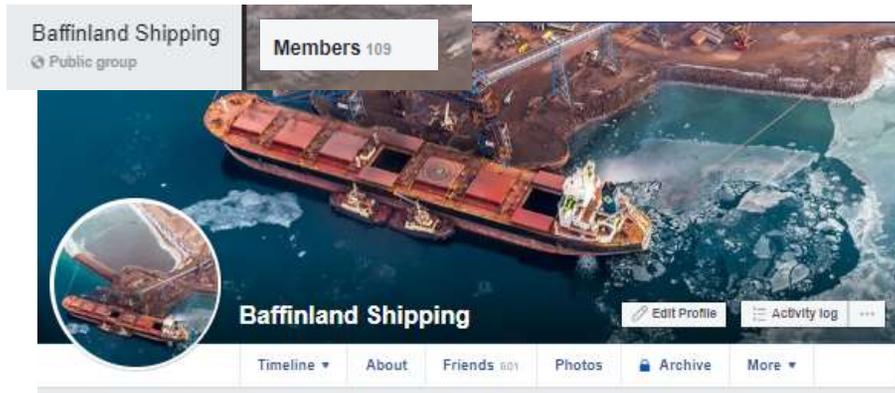
Email us at: [shipping@baffinland.com](mailto:shipping@baffinland.com)

\*\*\*\*Have notes that prevent the Baffinland office website listed to the public due to the COVID-19 pandemic\*\*\*\*

# During Shipping Season

1. Maintain communications with community members during the shipping season through the Pond Inlet Shipping Monitors
2. Set up Automatic Identification System (AIS) monitoring station
3. Maintain involvement of Inuit in monitoring programs\*\*\*

\*\*\*Not possible in 2020 due to COVID-19 pandemic





# Community Input

## What is Baffinland doing when ice is present?

- Baffinland has been using an icebreaking vessel at the beginning and end of the season to manage safe vessel transit when ice is present (~2 weeks at the beginning and end of season)
- Baffinland will not start shipping until confirmation that there is no more landfast ice along the entire Northern Shipping Route
- Baffinland will not start shipping until confirmation from the Mittimatalik Hunters and Trappers Organization that the floe edge is closed to hunting
- Transit restrictions in heavier ice concentrations: limiting the number of vessels traveling to and from Milne Port based on ice conditions
- Baffinland is not shipping during periods of seal pupping

# Vessel Speed

## What we have heard?

- Vessels (mostly sealifts) are travelling too fast
- Larger vessels and speed of vessels is creating wakes that affects hunters

## How are we addressing your concerns?

- All ship captains are provided with instructions for shipping including ship speed to follow
- In 2018 we reduced the ship speed to 9 knots unless not possible for safe passage
- Implementation of AIS monitoring alert system to track vessels while they are transiting through corridor to see where they are travelling and the speed they are travelling at
- We contact vessels when they are going too fast
- We prepare an internal report on ship speeds and discuss with vessel owners exceedances of ship speeds

# Narwhal Abundance and Noise

## What we have heard?

- Number of narwhals have been changing
- Hunters have to travel further to harvest narwhal
- Condition and health of narwhal may be declining
- Reasons for changing narwhal numbers may be related to climate, presence of killer whales, ice conditions, project shipping
- Narwhal move away from noisy vessels
- Icebreaking will scare narwhal away

## How are we addressing your concerns?

- Ore carriers to wait in Baffin Bay at least 40 km east of Nunavut Settlement Area
- Transit restrictions in heavier ice concentrations: limiting the number of vessels traveling to and from Milne Port based on ice conditions
- Conducting monitoring programs to assess if behavior, abundance or distribution of narwhal is being affected by the Project:
  - Bruce Head shore-based monitoring program
  - Aerial abundance surveys
  - Acoustic monitoring
  - 2017-2018 Tremblay Sound narwhal tagging program in collaboration with Fisheries and Oceans Canada

# Aquatic Invasive Species

## What we have heard?

- There are new species in the area since shipping started
- Concerns that invasive species could have negative effect on fish and marine mammals that are important food sources for community
- Invasive species are being introduced by ballast water discharged by vessels

## How are we addressing your concerns?

- Extension of invasive species monitoring program to include sampling at Ragged Island (note: ballast water is not discharged at Ragged Island)
- Ongoing monitoring of physical components of marine environment (sediment and plants), monitoring of fish presence and health, monitoring of abundance of marine mammals
- Improved quality control of ballast water testing process (note: all ballast water must be managed in accordance with regulations)

# Dustfall

## What we have heard?

- Red dust observed on snow is concerning
  - Snow will not be used for melting and making tea near Project Area

## How are we addressing your concerns?

- Identification of new mitigation measures:
  - Use of dust suppression on roads (e.g., Dust Stop); Reducing drop distances to stockpiles; Addition of hoods, shrouds and rubber bellows used on crush equipment (stackers and conveyors); Adjustments in conveyor heights to minimize ore drop
  - Stockpile suppressant (DusTreat) – product arriving on 2020 Sealift
- Amended Air Quality and Noise Abatement Management Plan (2020)
- Exploring use of satellite imagery to better assess the extent of dust dispersion during winter months when snow is present
- Ongoing monitoring of physical components of marine environment (water, sediment), monitoring of fish presence and health, monitoring of abundance of marine mammals

# Vessel Management

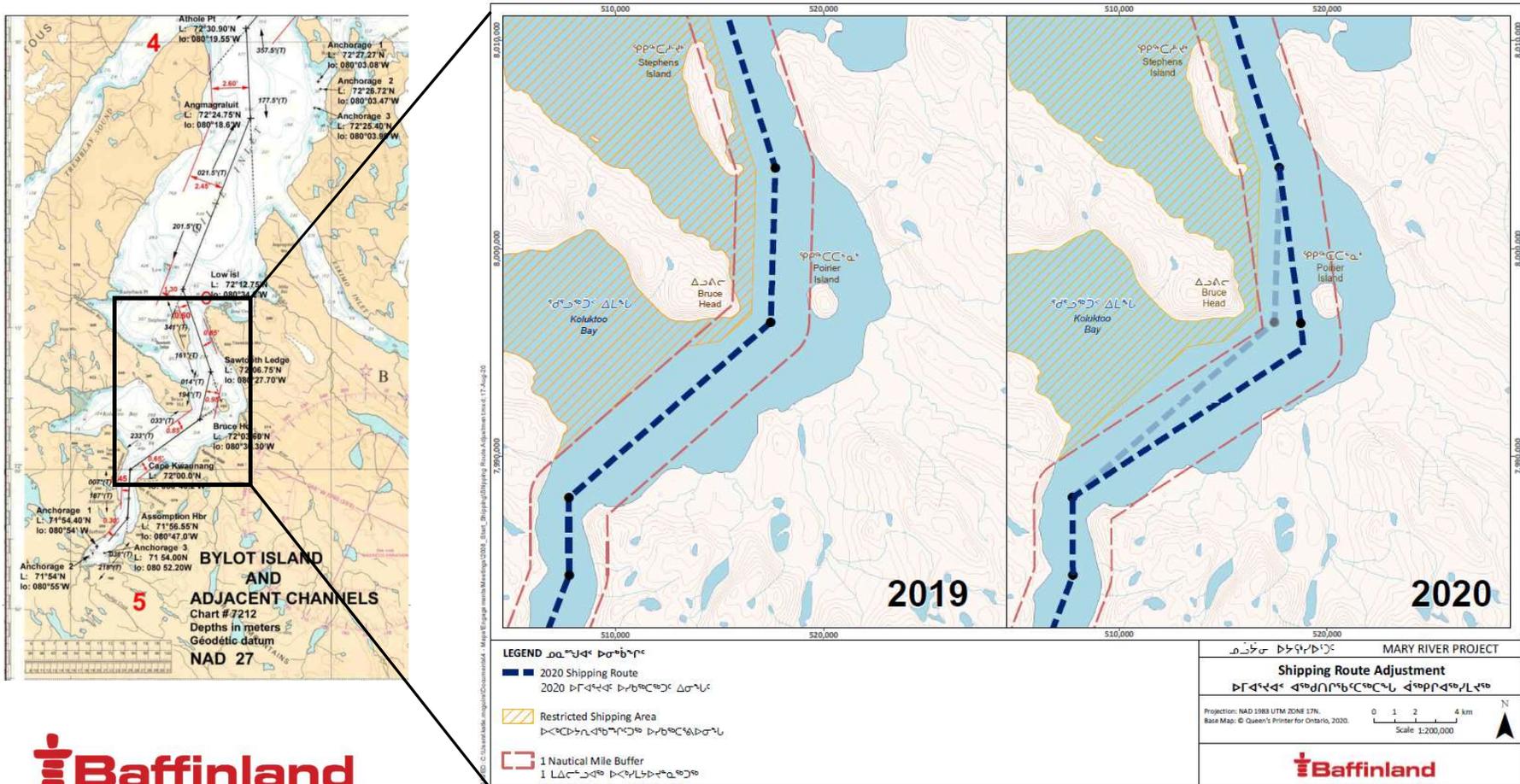
## What we have heard?

- Vessels are travelling too close to the western shoreline of Milne Inlet
  - Request to move slightly the shipping lane away from Bruce Head
- There are too many vessels drifting or anchored in Eclipse Sound
- There are too many ships in the area and it is disrupting hunting and availability of marine mammals
  - Preference for no drifting in Eclipse Sound or anchoring at Ragged Island

## How are we addressing your concerns?

- All ship captains are provided with a shipping route to follow
- Provide direction to captains that they should avoid deviating from shipping route unless this is necessary for safe passage
- No drifting in Eclipse Sound unless warranted for safety reasons and maximum of 3 vessels can anchor at any time
- Shipping lane was moved east and away from Bruce Head, just west of Poirier Island allowing still for safe navigation
- Commitment to have no more than 3 vessels anchored or in drifting zones in Eclipse Sound
- Implementation of AIS monitoring alert system to track vessels
- We are hiring two people from Pond Inlet to monitor ship activity through the season

# Shipping Route near Bruce Head and Poirier Island



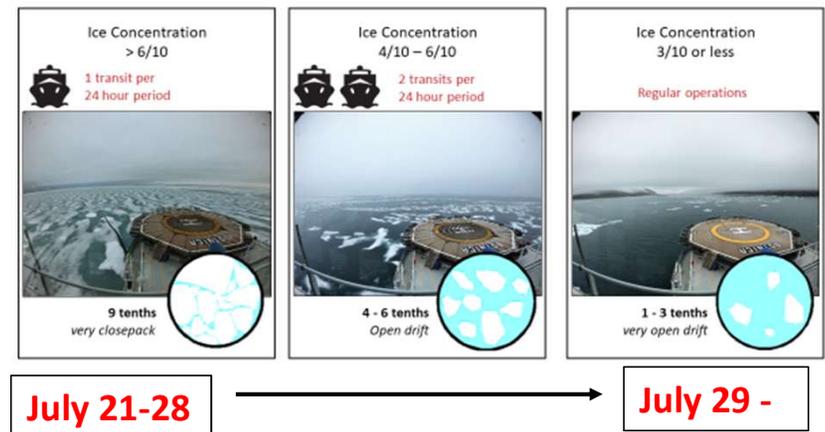




# 2020 Shipping Operations

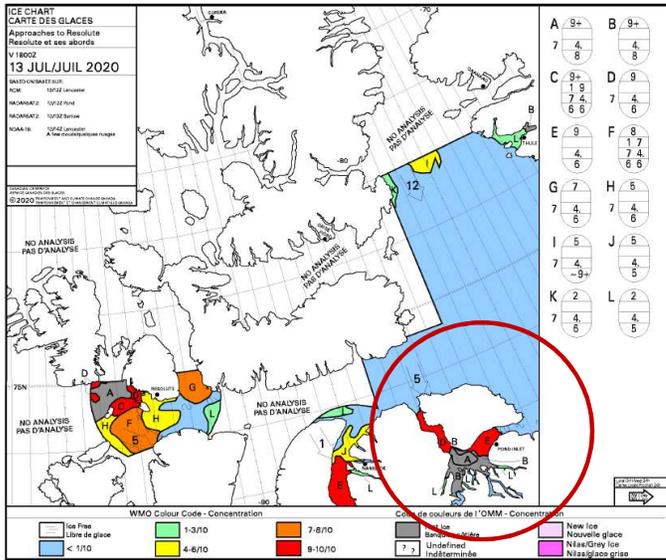
# 2020 Shipping Operations

- Iron Ore Carrier Vessels
  - Targeting shipment of up to 6 MTPA of iron ore
  - Operations started on July 21\*: convoy of 1 Botnica, 2 tugs and 2 ore carrier vessels
  - Will be supported by two tugs
  - Will be supported by the Botnica at the beginning (July 21 - 31) and end of shipping season.
  - Anticipating 70 -75\* ore carriers (140 – 150 transits)
    - 31-32 vessel currently loading at Milne Port (Aug 25)
- Resupply and Fuel Vessels
  - Anticipating 3\* cargo vessels
  - Anticipating 3 - 4 fuel tankers

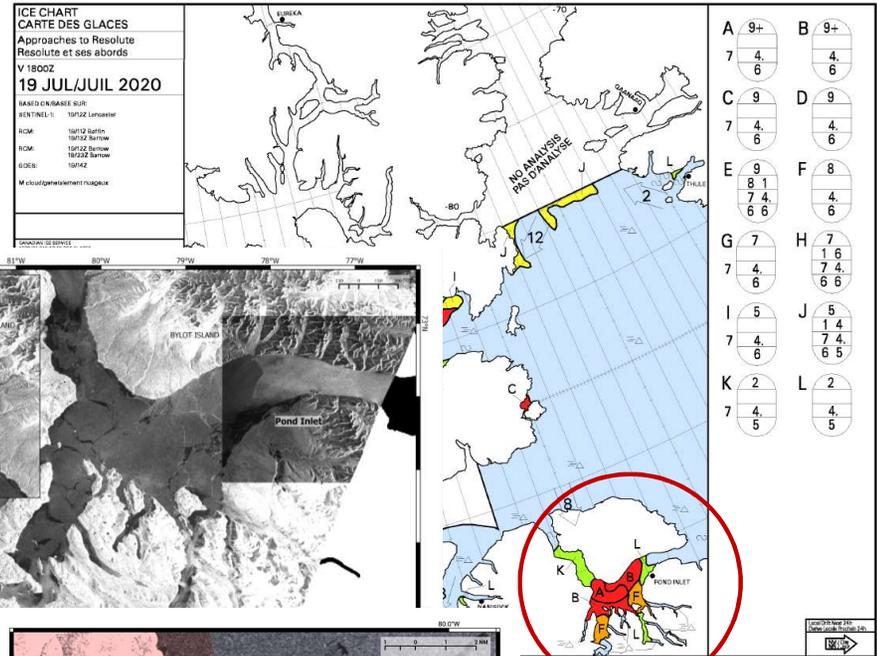
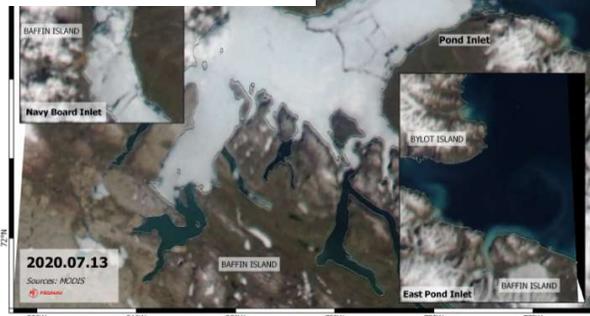


# 2020 Shipping Operations

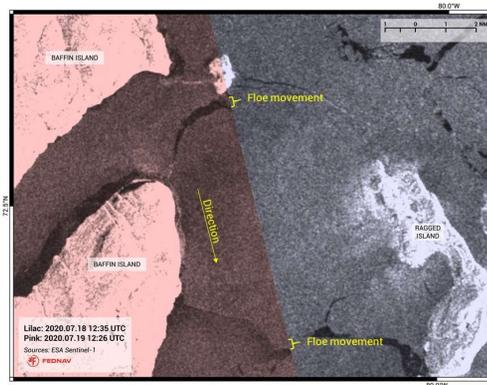
Ice chart – Approaches to Resolute – July 13, 2020 (Source: CIS)



July 13, 2020  
Landfast ice

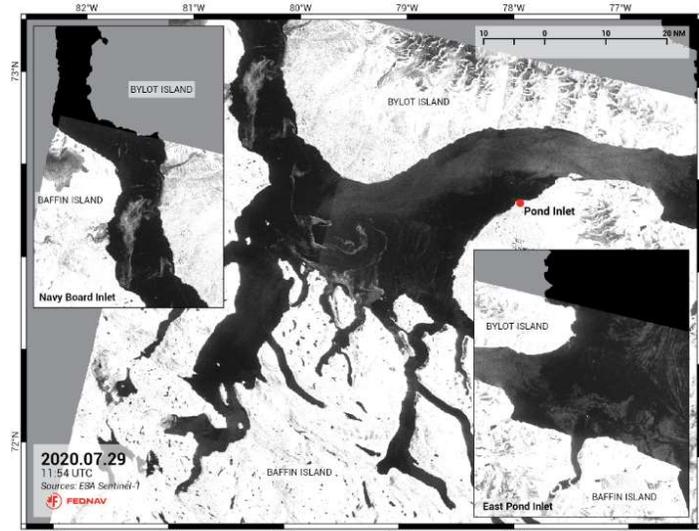
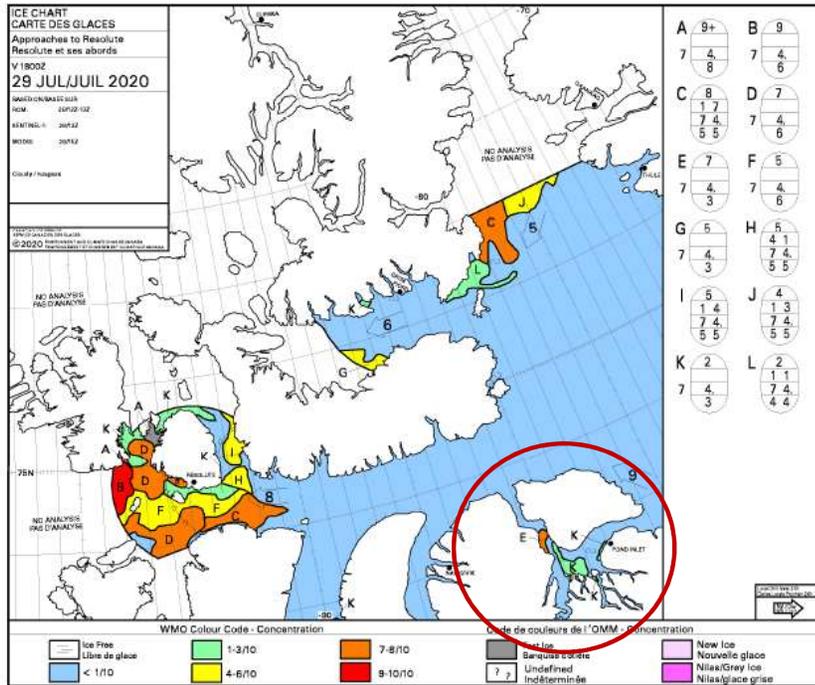


July 19, 2020  
1-3/10 - 9/10

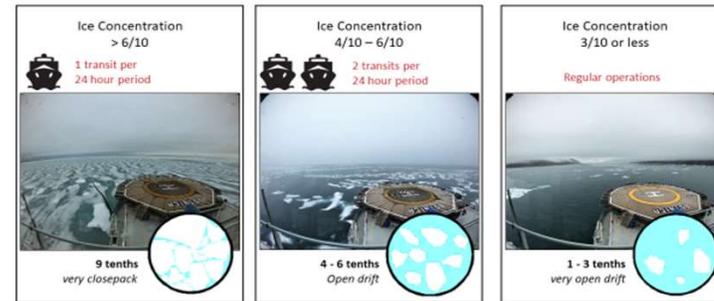


# 2020 Shipping Operations

Ice chart – Approaches to Resolute – July 29, 2020 (Source: CIS)



July 29, 2020  
 <1/10 - <4/10



21-28 July

29 July -



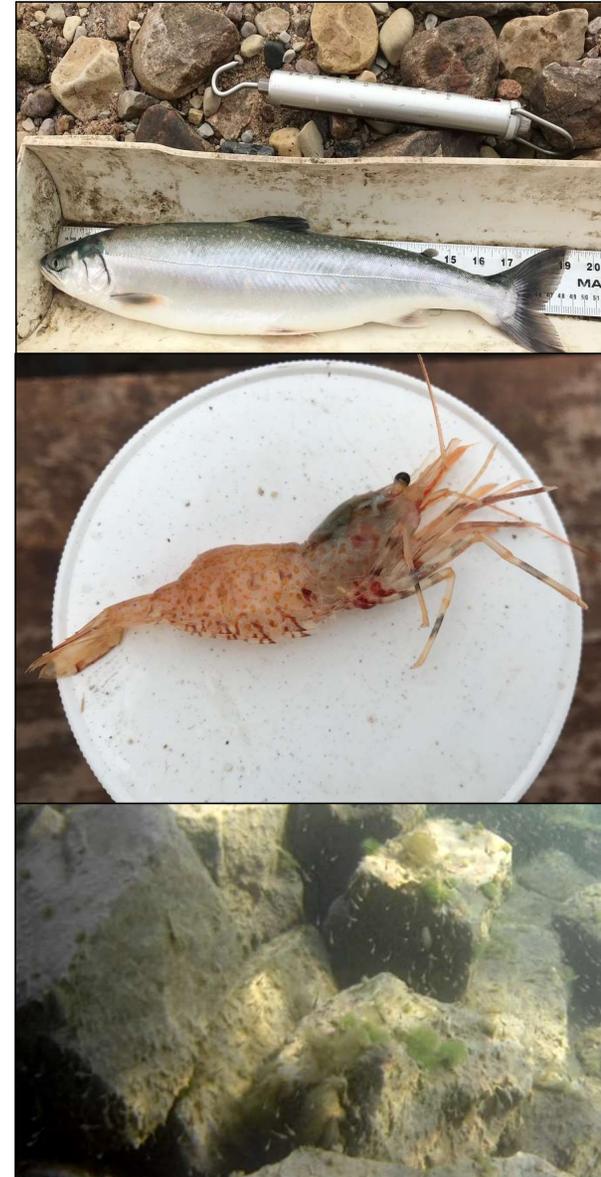
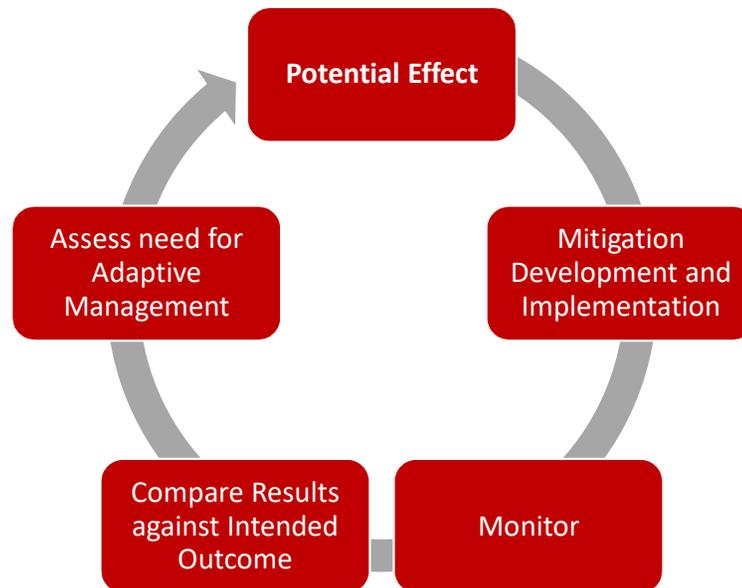


## NIRB Marine Monitoring and Mitigation Workshop – Mary River Project Marine Monitoring Programs

Pond Inlet – August 25, 2020

# Studying the Marine Environment

- Marine Mammals
- Water
- Sediment
- Invasive Species
- Fish



## Studying the Marine Environment

	Year										
	2006	2007	2008	2013	2014	2015	2016	2017	2018	2019	2020
Aerial Surveys and/or Narwhal Tagging Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bruce Head Shore-based Monitoring				✓	✓	✓	✓	✓	*	✓	✓
Ship-based Observer Program				✓	✓	✓			✓	✓	**
Acoustic Monitoring Program				✓	✓			✓	✓	✓	✓
Marine Environmental Effects Monitoring Program/AIS/Habitat Offset	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- Prior to shipping, environmental monitoring was conducted to understand the baseline conditions of Project area
- We use baseline information and monitoring data to track and compare if there have been any changes in the marine environment since we started shipping

# Marine Monitoring Programs - 2019



## Aerial Survey

Monitor narwhal abundance and distribution (Eclipse Sound summer herd) and other marine mammal species in Project area



## Bruce Head Shore-based Monitoring

Investigate narwhal response to shipping along the Northern Shipping Route by observing them from top of Bruce Head



## Marine Environmental Effects and Aquatic Invasive Species/Habitat Offset

Ballast water and video monitoring of vessel hulls  
Water quality, sediment, metals  
Fish abundance and health  
Ongoing monitoring for the construction of ore dock



## Ship-based Observer

This program investigates narwhal response to shipping activities by observing them from MSV Botnica

## Objectives:

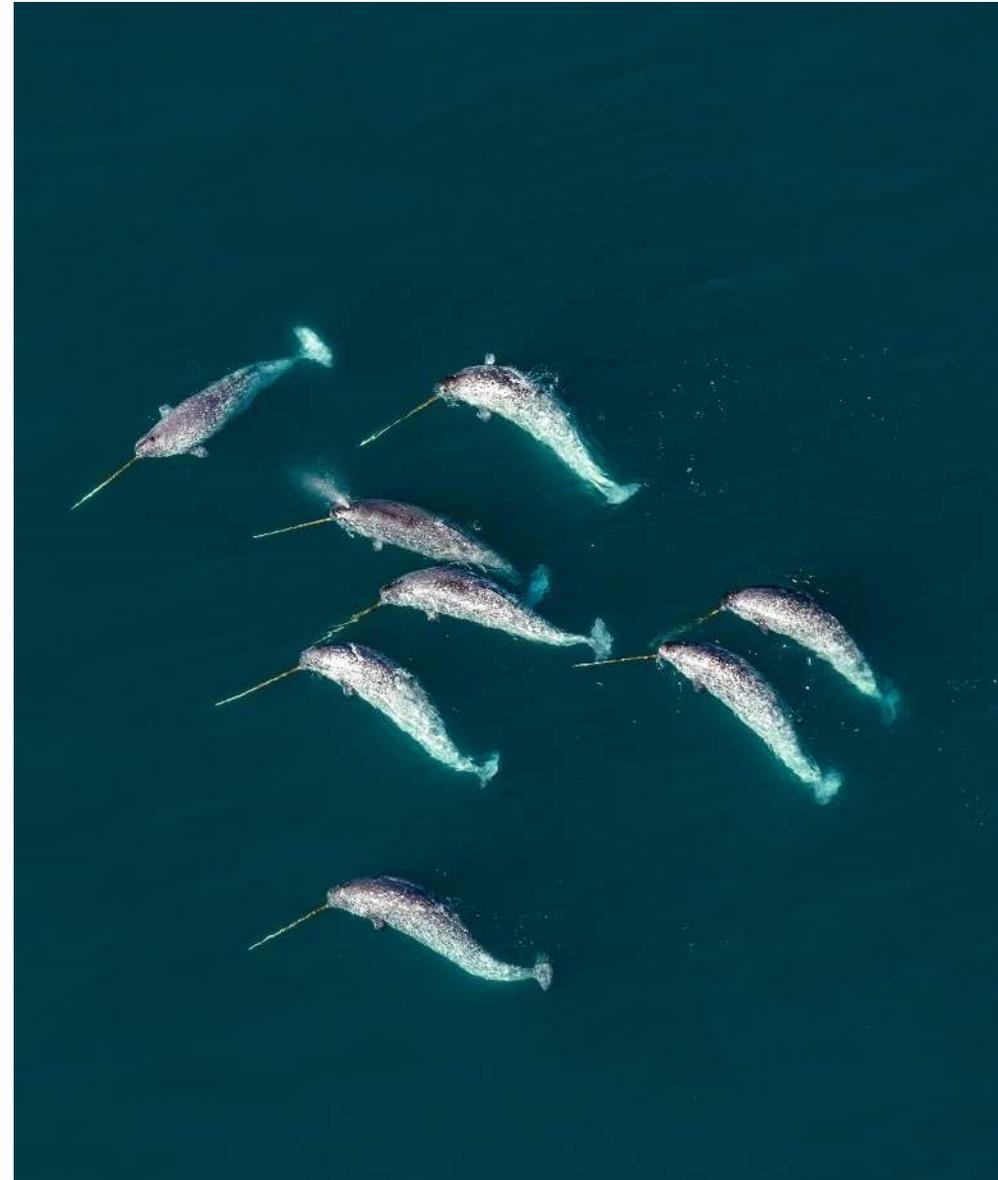
- Measure the effects that the shipping is having on the marine environment
- Assess the accuracy of predictions of effects
- Determines if adaptive mitigation measures need to be developed

## Employment and Training Opportunities - 2019

2019 Marine Monitoring Programs	Inuit Opportunities
MEEMP and AIS Monitoring Program	1 boat captain, 1–2 boat assistant (9 weeks)
Marine Mammal Aerial Survey Program	2 observers/plane; 2 weeks/plane (6 weeks)
Bruce Head Shore-based Monitoring Program	4 observers + 2 polar bear monitors (5 weeks)
Passive Acoustic Monitoring Program	3 outfitters (3 days)
Ship-based Observer Program	3 observers (6 weeks)
<b>Total</b>	<b>32 positions (87 weeks)</b>

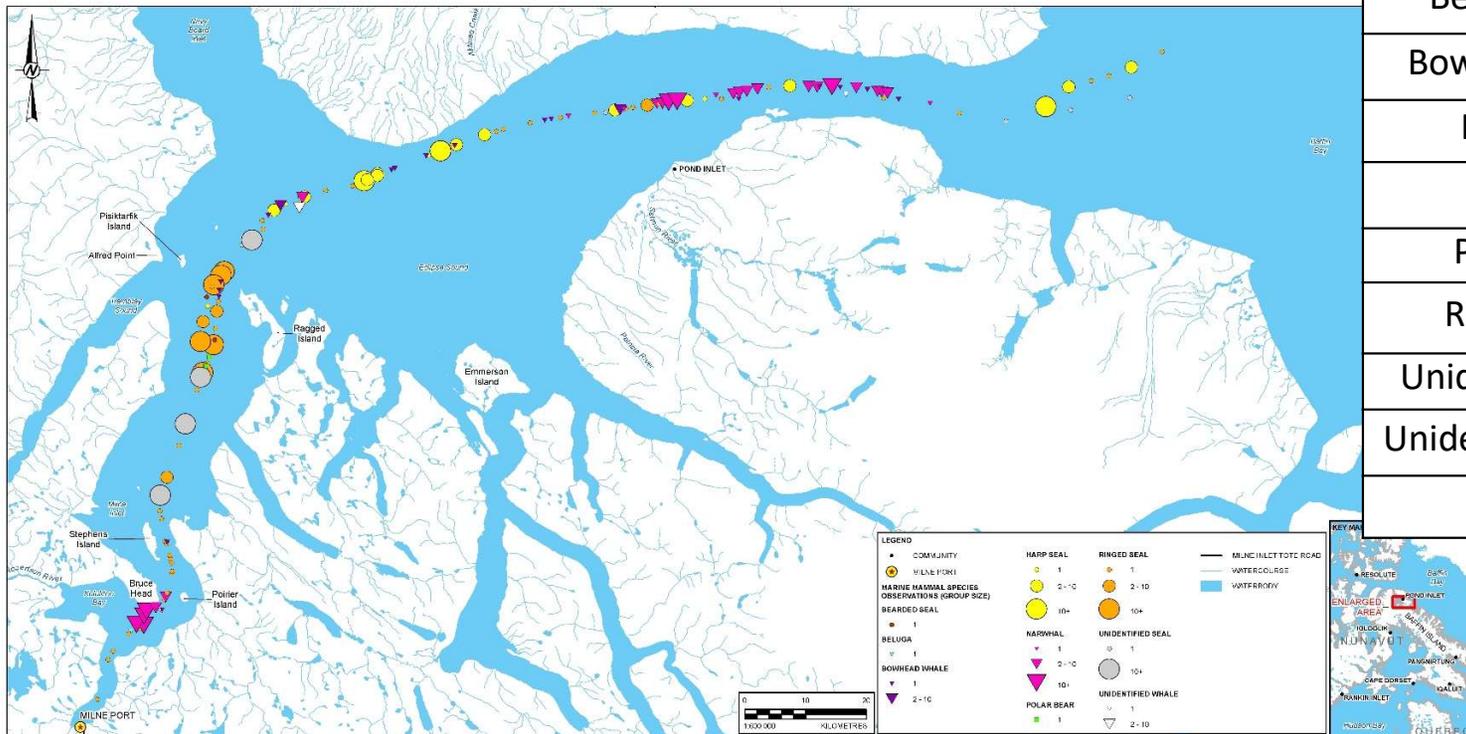
## Marine Mammals Monitoring – Results to Date

- Relative abundance of narwhal has remained relatively constant throughout 2014-2019
- Narwhal abundance in Eclipse Sound has also remained constant since pre-shipping
- Narwhal numbers highest from mid-August to mid-September
  - Most common in Tremblay Sound, Eclipse Sound West, Milne Inlet, and Koluktoo Bay
- Narwhal temporarily move away from vessels and then come back into the ship track line
- Studies will continue to further the understanding of effects – duration and distance of displacement



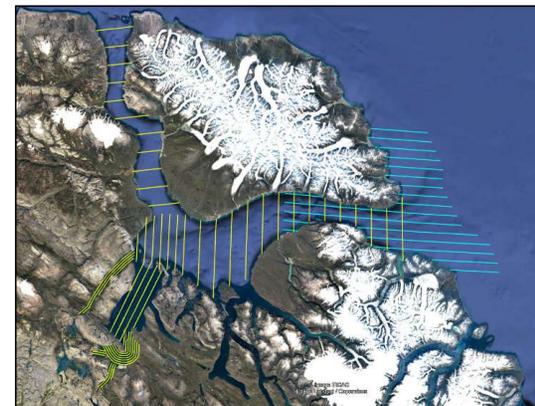
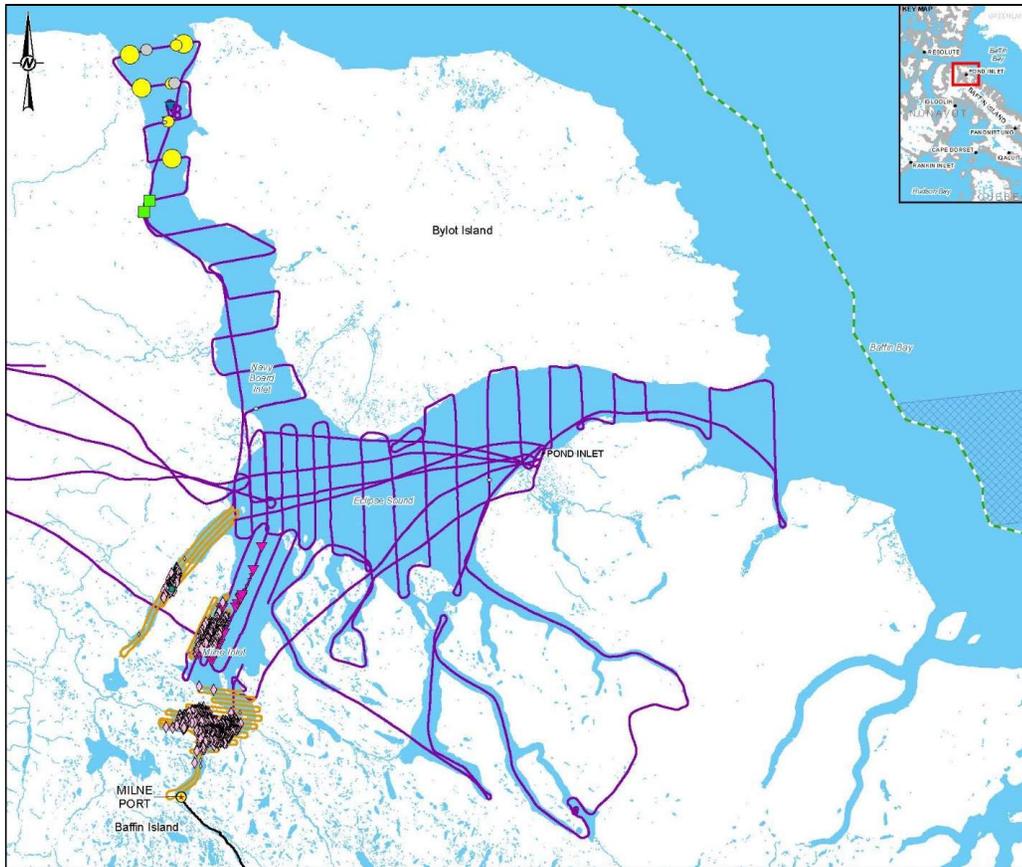
# 2019 Ship-based Observer Program

19–29 July 2019



Species	Total Number of Individuals
Bearded seal	4
Beluga whale	1
Bowhead whale	24
Harp seal	136
Narwhal	385
Polar bear	2
Ringed seal	722
Unidentified seal	1,176
Unidentified whale	3
<b>Total</b>	<b>2,453</b>

# Marine Mammal Aerial Survey Program – 25-26 August



Eclipse Sound

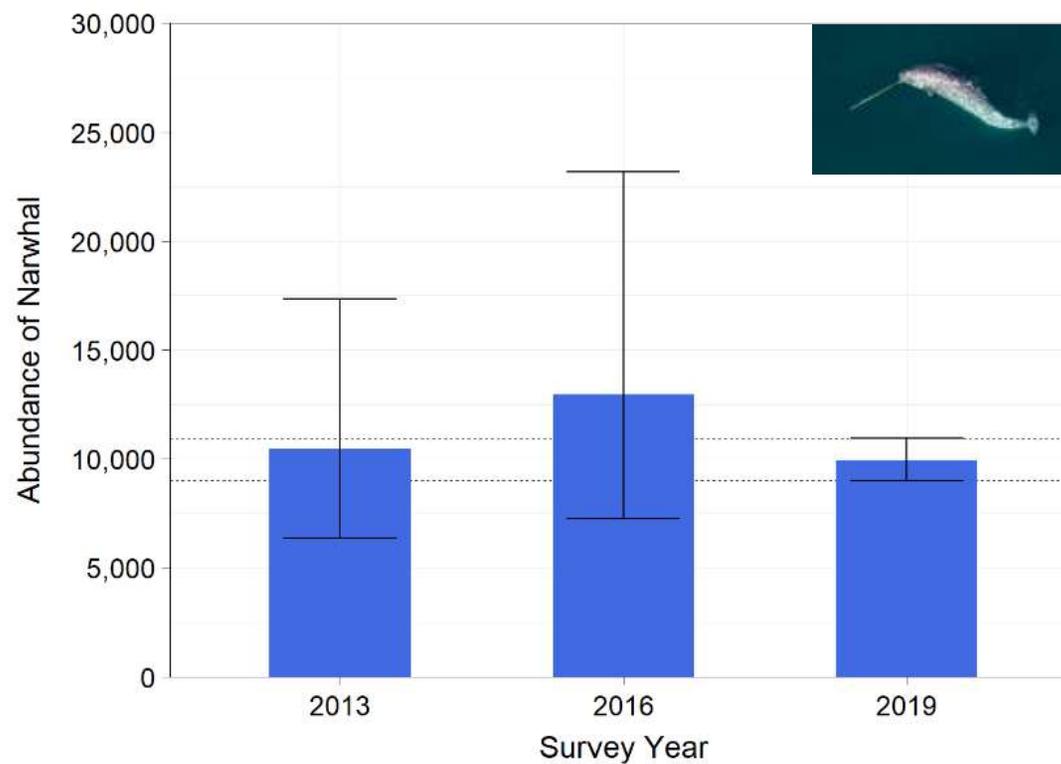


**Each plane:**  
2 biologists  
2 Inuit researchers  
(Pond Inlet and Arctic Bay)  
1 data recorder/survey  
coordinator

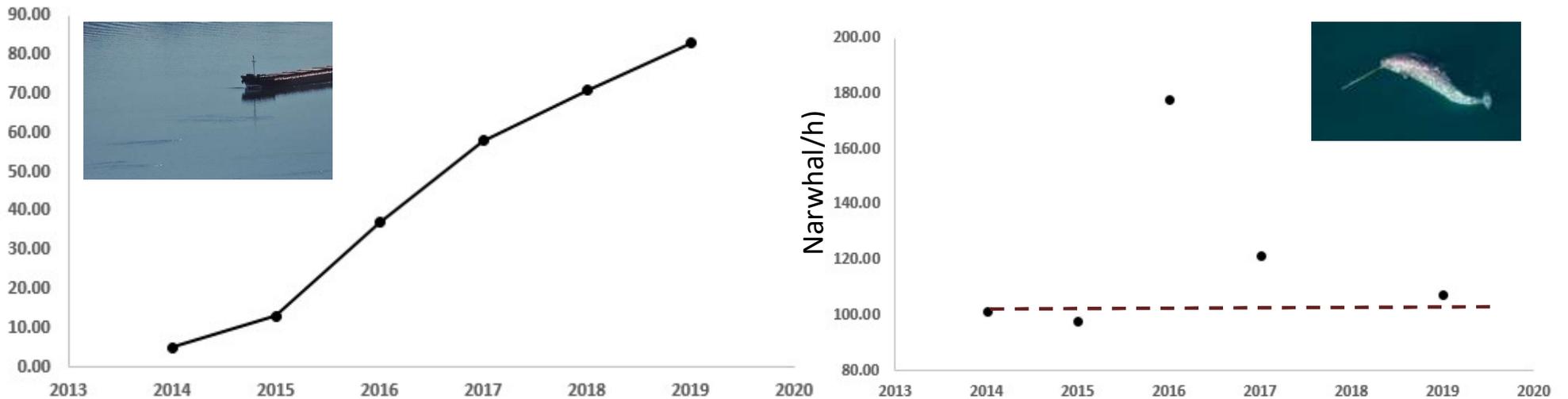


Admiralty Inlet

# Marine Mammal Aerial Survey Program – Annual Comparisons



## Bruce Head Shore-based Monitoring Program – Relative Abundance and Distribution (RAD): 2014-2017, 2019



# Bruce Head Shore-based Monitoring Program – Behavioural Study

- Group composition

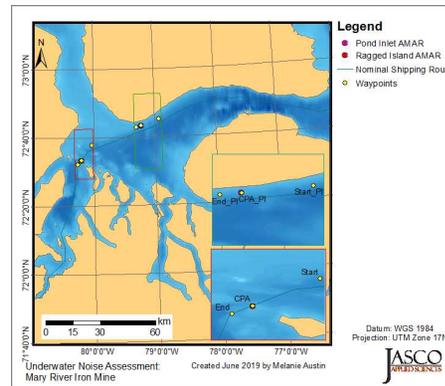
Year	Calves & Yearlings %
2014	39.9
2015	35.9
2016	36.8
2017	33.5
2018	N/A
2019	36.8



# 2019 Acoustic Monitoring

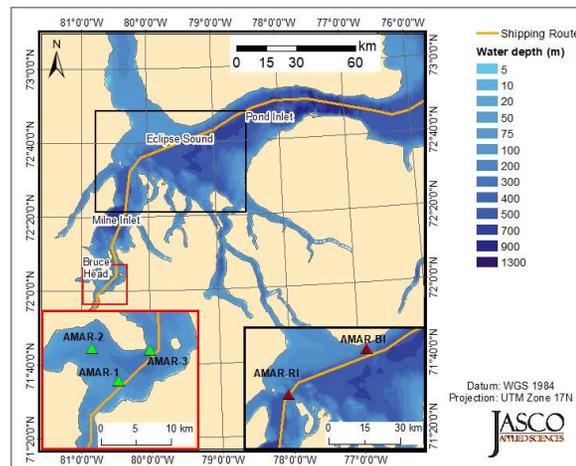
## Results - Early Shoulder Season

- 18 – 23 July, 2019
  - Less noise > 120 db than modelled
  - More quiet time < 120 db
- Additional data analysis required with newest 2020 data



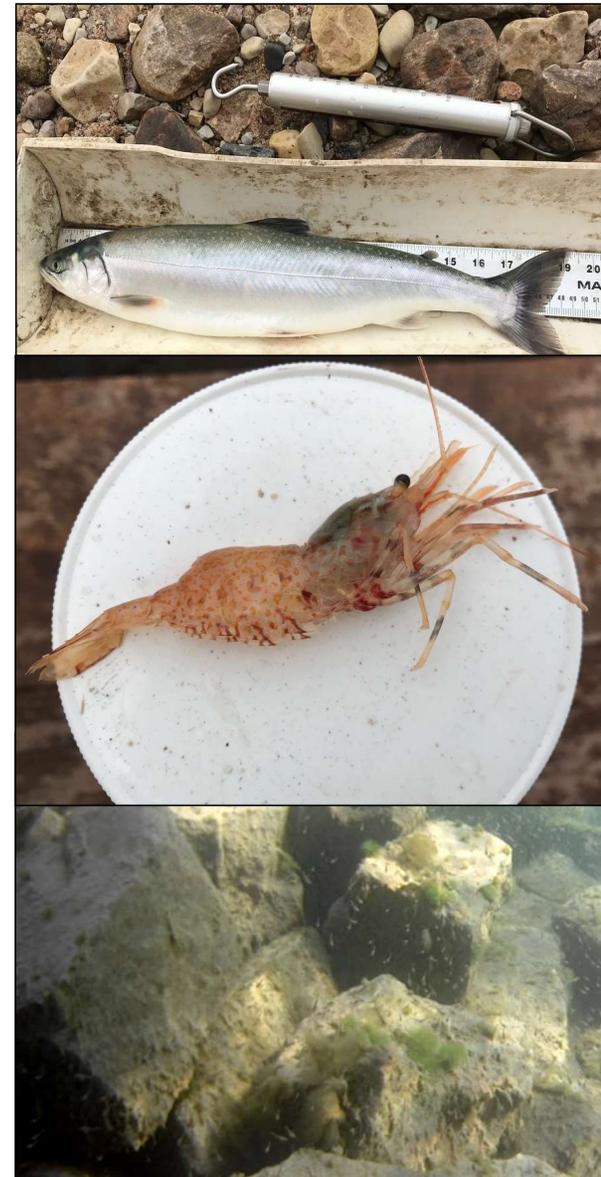
## Results - Open-water Season

- 5 August - 28 September, 2019
  - Less noise > 120 db than modelled
  - More quiet time < 120 db
- Additional data analysis required with newest 2020 data



# Marine Environment Monitoring – Results to Date

- Water Quality : no detection of Project-related effects
  - Water quality has been consistent between 2014-2019 and generally did not differ from pre-shipping conditions
  - Clear water: Low turbidity and total suspended solids
- Seabed changes : no detection of Project-related effects
  - Sediment quality has been consistent between 2014-2019
  - Sediment composition has been consistent between 2014-2019
  - No significant changes to seabed flora and fauna
- Fish Health and Numbers
  - Arctic Char most common during summer
  - Other species: sculpin, cod, Northern sand lance
  - Fish tissue collected does not exceed guidelines for metals and hydrocarbons
- Offset habitat functioning as fish habitat as intended
- Invasive species
  - One potentially invasive species has been found though further investigation is required to determine if presence in Milne Port is recent since it has been previously observed near Baffin Island



# Marine Environment Monitoring – Results to Date

- Water Quality: no detection of Project-related effects

- Water quality parameters within normal conditions
- Clear water: 100% transparency

- Seabed changes

- Sediment quality: no significant changes
- Sediment composition: no significant changes
- No significant changes in sediment structure

- Fish Health and Mortality

- Arctic Char mortality: no significant changes
- Other species: no significant changes
- Fish tissue condition: no significant changes

- Offset habitat

- Invasive species

- One potential invasive species detected



from pre-shipping

required to determine if presence in Immi Port is recent since it has been previously observed near Baffin Island





# 2020 Marine Monitoring Programs

# Marine Monitoring Programs - 2020

			
<p><b>Aerial Survey</b> Monitor narwhal abundance and distribution (Eclipse Sound summer herd) and other marine mammal species in Project area</p>	<p><b>Bruce Head Shore-based Monitoring</b> Investigate narwhal response to shipping along the Northern Shipping Route by observing them from top of Bruce Head</p>	<p><b>Marine Environmental Effects and Aquatic Invasive Species/Habitat Offset</b> Ballast water and video monitoring of vessel hulls Water quality, sediment, metals Fish abundance and health Ongoing monitoring for the construction of ore and freight docks</p>	<p><b>Ship-based Observer</b> Not possible in 2020 due to COVID-19 pandemic</p>

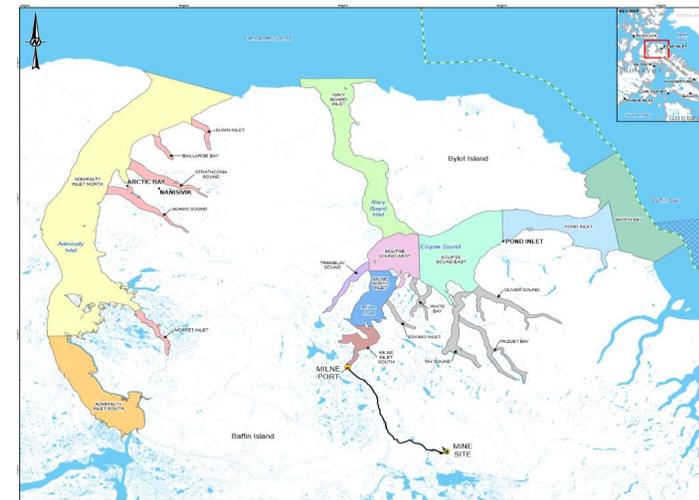
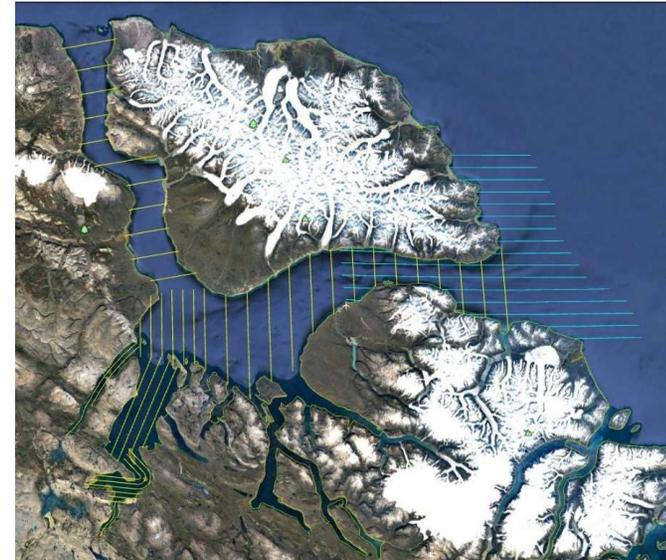
## Objectives:

- Measure the effects that the shipping is having on the marine environment
- Assess the accuracy of predictions of effects
- Determines if adaptive mitigation measures need to be developed



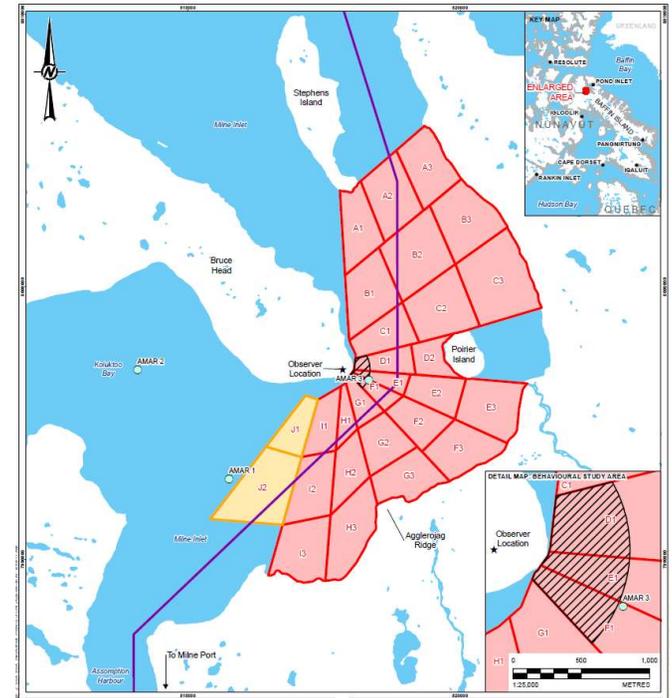
# 2020 Marine Mammal Aerial Survey Program

- 3 surveys
  - 1: Mid-July start; 1 plane
  - 2: Mid-August start; 2 planes
  - 3: End October; 1 plane (clearance survey)
- Based out of Mary River mine
  - Eclipse Sound
  - Admiralty Inlet



# 2020 Bruce Head Shore-based Monitoring Program

- Data collected on:
  - Relative Abundance and Distribution (RAD)
  - Group Composition and Behaviour
    - Human Activity
    - Vessel Traffic
  - Hunting
  - Weather and Anecdotal Observations
- Project-related vessels tracked via both satellite and shore-based AIS



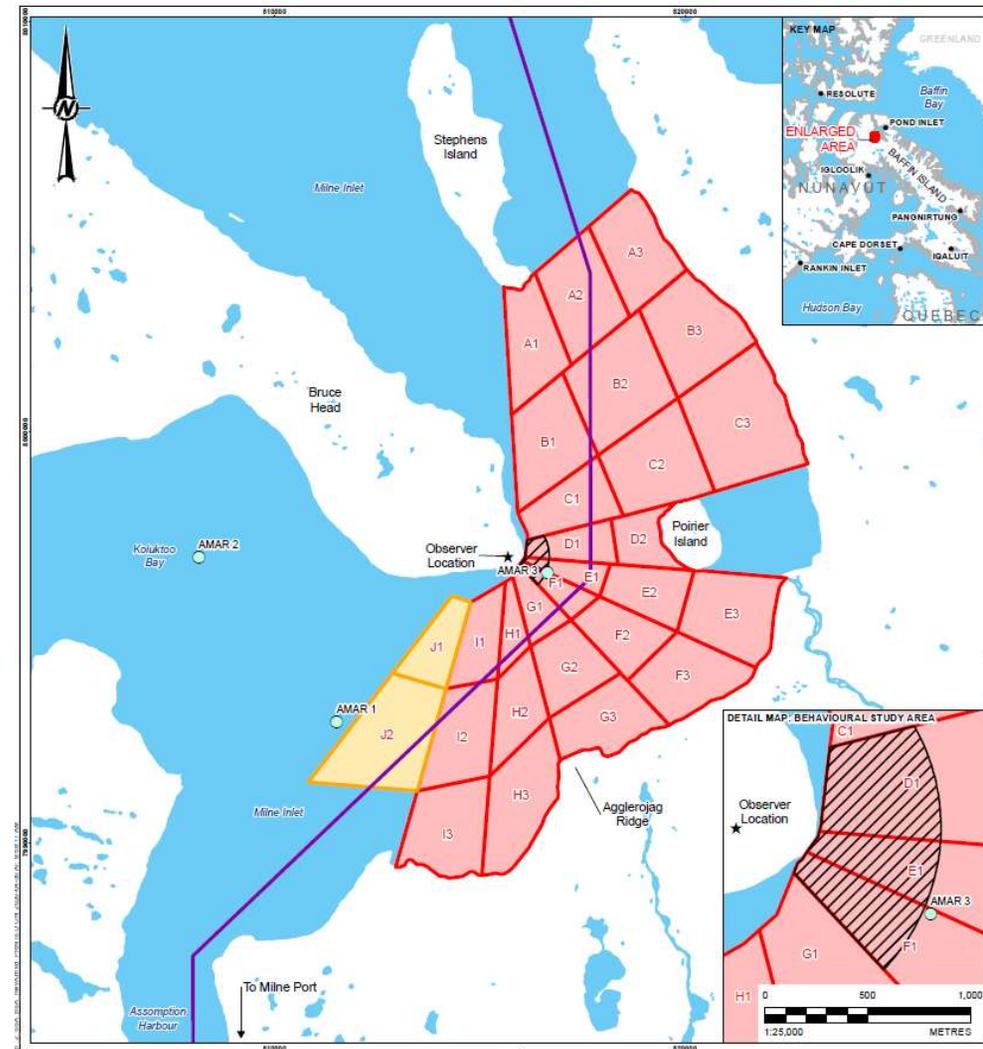
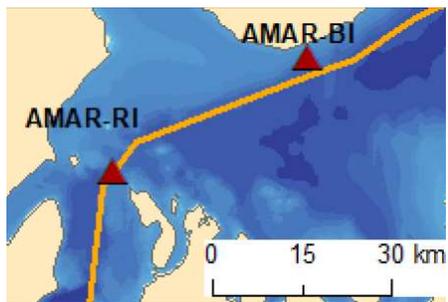
# Bruce Head Shore-based Monitoring Program

- 2020 Unmanned Aerial System (UAS) / Drone Component
- Duration: 4 weeks
- Proposed system by InDro Robotics:
  - Multiple drone types
- Transport Canada Special Flight Operations Certificate (SFOC)



# 2020 Passive Acoustic Monitoring Program

- Retrieval of two recorders deployed overwinter in North Milne and Eclipse Sound
- Deployment and retrieval of one recorder at Bruce Head to support visual monitoring program



## 2020 MEEMP Program

- MEEMP study physical and biological components:
  - Marine water quality
  - Marine sediment quality
  - Benthic infauna
  - Benthic epifauna and epiflora (seaweed)
  - Fish and fish habitat
  - Fish tissue
- 6th consecutive year of effects monitoring
- Field season (multiple-week program)
  - Started 21 July – ongoing



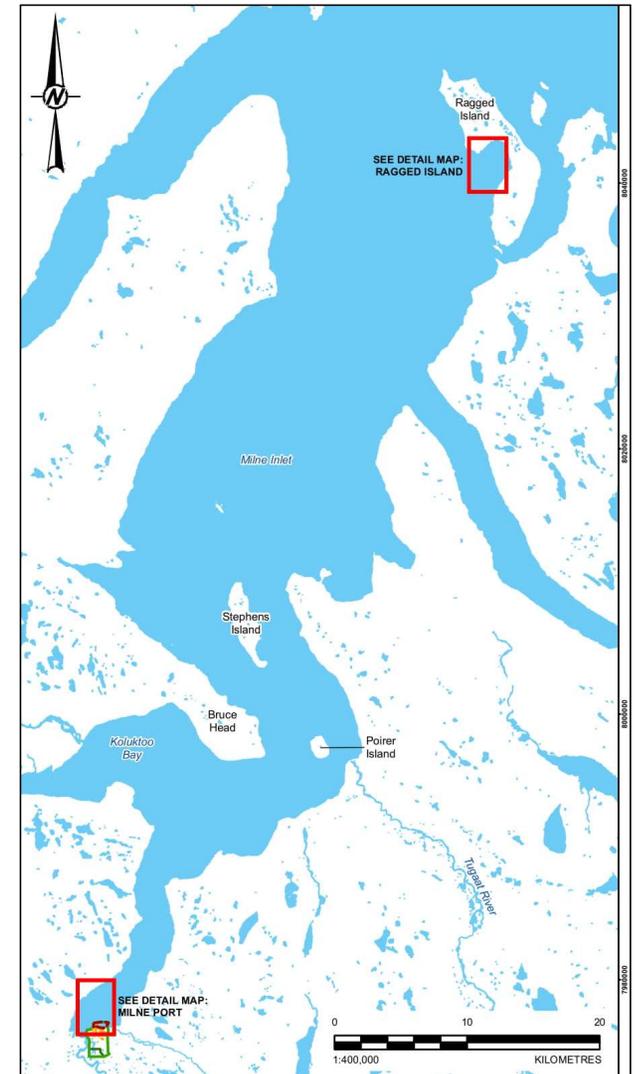
## MEEMP – Marine Fish

- Sampling 2 to 3 times weekly over the multiple-week program
  - Gill net, Fukui trap, fyke net, trawling, beach seine and angling
  - Relative abundance (Catch per Unit Effort), community composition and fish condition
- Fish health program
  - Aligned with federal regulatory requirements – Metal and Diamond Mining Effluent Regulations (MDMER)
  - Incidental fish mortalities (Arctic char, fourhorn sculpin) will be retained for fish tissue chemistry analyses, aging, and stomach content analysis
  - Additional sculpin to be collected to increase sample size if insufficient fish mortalities occur for analysis



# Aquatic Invasive Species (AIS) Program

- Milne Inlet: Milne Port and Ragged Island
- Multi-trophic level and multi-sampling method approach:
  - Zooplankton –vertical and horizontal oblique tows
  - Benthic infauna - sediment grabs at 60 stations
  - Epifauna and epiflora – Remotely-operated video surveys along established transects
  - Settlement surveys - settlement plates and baskets
  - Fish and mobile epifauna – fish sampling program
  - Use of high-resolution video system for underwater video transects and ship hull monitoring
- Biological monitoring of ballast tanks is not possible in 2020 due to restricted access to vessels due to COVID-19



# Marine Fish Habitat Offset Monitoring Program

- Marine Fish Habitat Offset Monitoring Program – Ore Dock in accordance with the Fisheries Act Authorization (FAA) issued for the Project (#14-HCAA-00525)
  - Year 6 in 2020
- Marine Fish Habitat Offset Monitoring Program – Freight Dock in accordance with the Fisheries Act Authorization (FAA) issued for the Project (#18-HCAA-00160)
  - Year 1 in 2020



# Ship-based Observer Program

- Program will not be run in 2020 due to boarding restrictions associated with COVID-19
- Program will resume in future pending COVID-19 situation
- Newly-signed Baffinland Agreement with Marine Mammal Observation Network providing basis for piloting tracking of incidental sightings by selected vessels





## NIRB Marine Monitoring and Mitigation Workshop – Mary River Project Overall 2020 Summary

Pond Inlet – August 25, 2020

# 2020 Shipping Season Summary

- Targeting shipment of up to 6 MTPA of iron ore
  - Operations started on July 21\*: convoy of 1 Botnica, 2 tugs and 2 ore carrier vessels
- 2020 marine monitoring programs are underway
  - \*\*\*No community member participation possible due to COVID-19 pandemic\*\*\*
- Shipping-related communications underway
  - Shipping monitors hired
  - Pre-shipping season meeting: 8, 15 July 2020
  - End of Shipping Season Meeting: to be determined





Questions?  
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