The role of project-based impact assessment in considering the impacts of resource development related Arctic shipping

by

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Abstract

Transportation by sea is the main method for the movement of goods in the Arctic. With longer ice-free periods, and new technology, the increases in ship traffic experienced over the past few decades are expected to continue. Resource development projects are an important source of ongoing increases in regional shipping. My thesis attempts to understand the potential of Nunavut's impact assessment (IA) framework to meaningfully identify and address the impacts associated with project related shipping. To achieve this purpose, I conducted a literature review and document review of several recent IAs in Nunavut. To enhance the data collected through the document review, I carried out interviews with experts and participants of the IAs studied.

The results of my work indicate that IA in Nunavut routinely includes shipping impacts within the scope of assessment, and many shipping related concerns have been documented throughout IA proceedings. Further, my findings indicate that IA can influence project shipping through mitigation measures and consultation requirements. However, my data also reveal that important factors serve to limit the reach of project-IA when attempting to impose conditions on project shipping that exceed the requirements of regional shipping regulations. One example of this relates to the lack of spill response capacity and the implications of this for the Canadian Arctic. Nonetheless, my findings demonstrate that IA is an important forum for resource management in Nunavut, and that IA offers critical opportunities for shipping impacts to be addressed on a project basis moving forward.

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Table of Contents

List of Tables

List of Figures

Abbreviations and Acronyms

AEM – Agnico Eagle Mines Ltd.
AWPPA – Arctic Waters Pollution Prevention Act
CCG – Canadian Coast Guard
CIRNAC – Crown-Indigenous Relations and Northern Affairs Canada
CSA – Canada Shipping Act
DEIS – Draft Environmental Impact Statement
DFO – Fisheries and Oceans Canada
DoE – Department of Environment (Nunavut)
ECCC – Environment and Climate Change Canada
EEZ – Exclusive Economic Zone
EIS – Environmental Impact Statement
ERP – Emergency Response Plan
FEIS – Final Environmental Impact Statement
GENICE – Microbial Genomics for Oil Spill Preparedness in Canada's Marine Environment

GN – Government of Nunavut
HFO – Heavy Fuel Oil
HTO – Hunters and Trappers Organization
IA – Impact Assessment
IMO – International Maritime Organization
IPG – Institutions of Public Government (Nunavut)
IQ - Inuit Qaujimajatuqangit
IR – Information Requests
KIA – Kivalliq Inuit Association
KWB – Kivalliq Wildlife Board
MEMP - Marine Environmental Management Plan
MEWG – Marine Environment Working Group
MMSO – Marine Mammal and Seabird Observation
NIRB – Nunavut Impact Review Board
NLCA – Nunavut Land Claims Agreement
NLUP – Nunavut Land Use Plan
NMR – Nunavik Marine Region
NORDREG - Northern Canada Vessel Traffic Services Zone Regulations
NPC – Nunavut Planning Commission
NSA – Nunavut Settlement Area
NTI – Nunavut Tunngavik Incorporated
NuPPAA – Nunavut Planning and Project Assessment Act
OHF – Oil Handling Facility
OPEP – Oil Pollution Emergency Plan
PC – Project Certificate
PHC – Pre Hearing Conference
PPP – Policy, Plan and Program
REA – Regional Environmental Assessment
RSA – Regional Study Area
SEA – Strategic Environmental Assessment
SMP – Shipping Management Plan
SOPEP – Shipboard Oil Pollution Emergency Plan
TC – Transport Canada
TEMMP – Terrestrial Environment Management and Monitoring Plan
VEC – Valued Ecosystem Component
WWF – World Wildlife Fund

Chapter 1: Introduction

1.1 Context and Background

Transportation by sea is the method of choice for the movement of goods in Arctic Canada. In Nunavut, maritime shipping is the main transportation method for community resupply, tourism, research, and resource extraction (Ocean Conservancy, 2017). Given the continued melting of summer sea ice, possibilities for dramatic increases in shipping in Canada's Arctic waters are expected (Anderson, 2009; Arctic Council, 2009; DeCola, Fletcher, Nuka Research and Planning Group LLC, Hughes, & Consulting, 2017; Mjelde, Martinsen, Eide, & Endresen, 2014; Ocean Conservancy, 2017; Pizzolato, Howell, Derksen, Dawson, & Copland, 2014), and in the context of the fragility of the Arctic marine environment, increases in shipping are accompanied by increases in the risk of pollution and environmental degradation from ships (Gulas, Downton, D'Souza, Hayden, & Walker, 2017; Marty, Nicoll, Potter, Wallace, & Lumière, 2016; Wilkinson et al., 2017; WWF Canada, 2014, 2017).

According to Kikkert (2012) and Mussells, Dawson, and Howell (2017), while shipping will increase across the sectors listed above, shipping due to resource extraction projects has the greatest potential to significantly increase regional shipping in Canada's Arctic. At the same time, concerns are being raised about the extent to which Arctic communities are prepared for the associated risks. Multiple studies and reports suggest, for example, that significant gaps and shortcomings exist in the Arctic's oil spill and pollution response plans (DeCola et al., 2017; Ocean Conservancy, 2017; Thorsell & Leschine, 2016; Vard Marine, 2015; Wilkinson et al., 2017; WWF Canada, 2014, 2017). Given the role that resource development will play in the expansion of Arctic shipping and the gaps identified in the response regime, ensuring that the consideration of the impacts posed by shipping are part of the decision process for resource extraction projects is essential.

The potential for environmental degradation of the Arctic marine and coastal ecosystems due to shipping is well known (DeCola et al., 2017; Gulas et al., 2017; Lindgren, Wilewska-Bien, Granhag, Andersson, & Eriksson, 2016), and environmental concerns in the Arctic region are heightened as a result of the extreme fragility of the ecosystems found there (Gulas et al., 2017). Ongoing impacts due to climate change also have the potential to amplify any shipping related impacts in the marine environment further (WWF Canada, 2014).

The reality of maritime shipping is that some level of impact and environmental degradation is inevitable. Lindgren et al. (2016) point out that pollution from ships is not solely the result of large-scale spills, but that ships spill and leak oil as part of regular operations. As a result, the pollution risk from shipping corresponds with the density or amount of traffic in a given area (Marty et al., 2016). This helps explain the need for careful consideration of potential impacts and risks when new shipping projects are proposed, along with the importance of developing adequate regulations and emergency response capacities to mitigate the associated impacts and risks.

Broadly speaking, impact assessment (IA) is the process through which resource development projects are approved on the basis of thorough consideration of the potential impacts they will cause and implementation of approaches to mitigate those impacts. The IA process allows for economic development and environmental consequences to be debated, and should allow environmental considerations to enter decision-making spaces (Noble, 2015). In Nunavut, the Nunavut Impact Review Board (NIRB) is the institution responsible for overseeing the assessments of development projects in the Nunavut Territory. As required by NIRB, project proposals must be developed in such a way that they conform to existing land use plans and address the demands and concerns of local citizens, Inuit organizations, and governmental agencies (Barry, Granchinho, & Rusk, 2016).

Once a project is approved through an IA, the regulatory framework that governs shipping in the region applies to any project shipping activities. Shipping and vessel traffic is primarily regulated and maintained by several federal agencies, such as Transport Canada (TC) and the Canadian Coast Guard (CCG). Pollution protection and operational rules are enshrined in numerous pieces of Federal legislation, such as the Canada Shipping Act (CSA) and the Arctic Waters Pollution Prevention Act (AWPPA). Nonetheless, Arctic communities and ecosystems are left vulnerable to the impacts of potential oil spills. Numerous voices suggest that significant gaps and shortcoming exist throughout Canada's Arctic oil spill response plans (Dawson, Pizzolato, Howell, Copland, & Johnston, 2018; DeCola et al., 2017; Gulas et al., 2017; WWF Canada, 2017). According to Wilkinson et al. (2017), the need for research, technical understanding, practical skills, and logistically sound response plans is only being addressed slowly, and remains a work in process. Recent developments such as the Oceans Protection Plan should strengthen Canada's Oil Spill Preparedness and Response Regime by funding a series of initiatives for research, marine safety, surveillance and emergency preparedness, but more work needs to be done (Transport Canada, 2019).

An ongoing research project that will attempt to address some of the shortcomings cited above is the Microbial Genomics for Oil Spill Preparedness in Canada's Marine Environment – or GENICE – project. The GENICE project is devoted to improving technical understanding for oil spill response in Canada's Arctic and strives to address the need to further develop preparedness and response strategies for fuel spills in the Arctic by combining genomics, analytical chemistry, and sea ice geophysics with economic, policy and local expertise, with the specific focus of developing the role of bioremediation of fuel spills in the Arctic marine environment. Ultimately the GENICE project wants to inform research and policy development in oil spill response while working alongside communities in in the Hudson Bay area of Nunavut (GENICE, 2016). My research, focused on the IA process, is aligned broadly with these policy objectives of the GENICE project.

The inclusion of shipping impacts into IA processes, according to Andersson, Brynolf, Landquist, & Svensson (2016), is "uncommon," even though many of the procedural and analytic tools used in IA could be of use when managing shipping practices, impacts and risks (270). Gulas et al. (2017) suggest that IA has the potential to carry out important tasks, such as establishing important baseline conditions, quantifying the risks of Arctic development, and improving pollution prevention and spill response regimes by creating a space for cooperation between stakeholders around resource development.

A recent paper by Thiessen, Noble, & Hanna (2020), specifically addressed the identification of shipping impacts within recent IAs in Nunavut, demonstrating that shipping impacts in the Arctic are a contemporary area of study. Since resource extraction projects on the Nunavut landmass have the potential to greatly increase regional shipping, and given the fragility of the Arctic marine environment, the impact assessment process for resource development provides a potential space for shipping related impacts to be considered and mitigated. In the context of shipping however, Andersson et al. (2016), suggest that IA remains an underused tool.

1.2 Research Purpose Statement

The purpose of this research was to investigate the potential of Nunavut's impact assessment (IA) framework to meaningfully identify and address issues associated with project related shipping and the accompanying impacts of spills into the marine environment.

1.3 Research Objectives:

1. To explore a recently completed IA of a project with shipping implications in Nunavut to examine what concerns were raised about shipping, whether and how shipping increases were considered, and what shipping outcomes were established through IA.
2. To establish how the relevant local and regional spill response plans have, will be, or could be modified as a result of IA process outcomes.
3. To understand the extent to which IA has been used to address shipping impacts associated with resource extraction projects in the Arctic context and the interface of IA decisions with the regulatory regime.
4. To develop policy recommendations regarding IA practice relevant to dealing with shipping and spill risks associated with resource projects in Nunavut.

1.4 Research Approach and Methods

My research was grounded in a constructivist philosophical worldview, a qualitative research approach, and used a case study strategy of inquiry. The combination of these approaches helped guide my research by creating a process that allowed me to understand how different people and organizations understand the reality of resource extraction and oil spill response in Nunavut, and allowed me to use their concerns and explanations to understand their perspectives and gain an in-depth understanding of a specific IA case.

The primary data collection methods used for this research were document review and interviews. Through the review of IA documents I was able to identify the main narrative of the IA process for my main case study, and in similar secondary cases to add a broader perspective to my understanding. Interviews with participants who were active in the IAs studied supplemented this data by adding additional perspectives, such as the understanding and motivations of experts in the IA process and regulatory regime, as well as the local perspectives of the IA process.

These primary methods were my starting point, as detailed in Chapter 3, but my research also took on an iterative and adaptive approach (Nelson, 1991), allowing me to be as responsive and flexible as possible as my research unfolded in uncertain times due to the Covid19 pandemic.

1.5 Contribution to Knowledge

The potential for IA to effectively evaluate the impacts of Arctic shipping remains underutilized (Andersson et al., 2016; Gulas et al., 2017). At the same time, Dawson, Pizzolato, Howell, Copland, & Johnston (2018), have shown specific examples in Nunavut, such as Chesterfield Inlet and Baker Lake, where communities have seen dramatic increases in ship traffic due to nearby mineral developments. Since resource projects have the potential to dramatically increase regional shipping in the Arctic, the findings from this research may be useful in demonstrating the current capacity, and potential role that IA could have in creating safer shipping rules and helping communities increase their local and regional spill response capacity through the IA process.

1.6 Thesis Organization

The thesis is organized into 7 chapters. Following the introduction, Chapter 2 considers the literature related to the regulatory and policy framework around shipping, spill response planning in the Arctic, and the IA process in Nunavut. Chapter 3 details the methods guiding this project. Chapter 4 provides an in-depth description of the primary case study based on the document review. Chapter 5 includes descriptions of the secondary cases and identifies regional trends regarding the inclusion and assessment of shipping impacts across the project IAs. Chapter 6 addresses the capacity for IA to influence project-related shipping and how IA decisions interact with the existing regulatory regime for Arctic shipping, and describe IA as a tool for the governance of Arctic shipping. Finally, Chapter 7 presents the conclusions of my research in relation to the objectives of the study.

Chapter 2: Arctic shipping and impact assessment

2.1 Arctic Shipping and Oil Spill Risk and Response

According to Dawson et al. (2018), the Arctic may be the region most dependent on the marine transportation industry in Canada. As the primary transportation method for community resupply, marine tourism, research, and resource development in the region (Ocean Conservancy, 2017), the volume of marine shipping has risen sharply in recent years and is expected to continue to increase in the coming decades (Dawson et al., 2018; WWF Canada, 2014).

Due largely to the receding summer sea ice, projections of increasing transarctic shipping and significantly longer shipping seasons are common place (Anderson, 2009; Theocharis, Pettit, Rodrigues, & Haider, 2018; Zhu, Fu, Ng, Luo, & Ge, 2018). In summer 2013 the first bulk carrier navigated the Norwest Passage (WWF Canada, 2017), but at this point international cargo shipping through the Canadian Arctic archipelago is not seen as a viable option (Pizzolato et al., 2014). Instead, Kikkert (2012) and Marty, Nicoll, Potter, Wallace, & Lumière (2016) suggest that resource development in the Arctic comes with the highest potential for dramatic increases in shipping activity. Land-based mining is well established in Nunavut and is certain to greatly increase regional shipping traffic in the future with many mining projects slated for development (CIRNAC, GN, NTI, & CNGO, 2018; Ocean Conservancy, 2017; WWF Canada, 2014).

2.1.1 Shipping impacts and the marine environment

There are several important factors that make the Arctic especially vulnerable to impacts from shipping and fuel spills. These include the presence of vulnerable species, highly specialized ecosystems, extreme remoteness, and difficult environmental conditions for spill response (Gulas et al., 2017; Wilkinson et al., 2017). Spilled fuel contains elements that are toxic to many forms of animal and plant life, suggesting that oil in the environment, whether through large discharge events or prolonged leaks, can have anything from acute to long term effects on aquatic life and the function of ecosystems (Lindgren et al., 2016). These factors suggest that an oil spill poses a significant and serious risk to the Arctic marine environment and the people who live in the region (Dawson et al., 2018).

In addition to accidental hydrocarbon discharges, additional pollution from shipping includes ballast water impacts, and discharges of small quantities of lubricants, oils, and other contaminants as part of regular operations (Vard Marine, 2015). Additional important impacts to the marine environment include the potential for the introduction of invasive species, ship-based noise pollution, and potential collisions between ships and marine mammals (Ocean Conservancy, 2017). Wilkinson et al. (2017) highlight that our true understanding of these impacts is incomplete.

According to World Wildlife Fund Canada (2014), as sea ice retreats due to climate change, so does the foundation of Arctic marine life. Arctic ecosystems are fragile and have a limited ability to accommodate change due to the fact that the species that make the Arctic their home are highly specialized to their environment. Virtually all species in the Arctic are adapted in one way or another to thrive in the cold temperatures and frozen seas. In addition, food chains in the Arctic are relatively short, meaning that species have few alternative food sources if changes to species composition were to occur (Laidre et al., 2015).

Cold temperatures also contribute to the slow decay and buildup of organic material. Therefore, the recovery rate, or resilience of the Arctic environment is not as high as temperate regions with longer growing seasons and more abundant biodiversity (Gulas et al., 2017). This concept is especially important when the potential for damages due to oil spills exists. Lindgren et al. (2016) describe how bacteria, fungi, and algae able to degrade hydrocarbons play a very important role in oil spill recovery. Gulas et al. (2017) suggest that low temperatures, slowing the metabolic rates of bacteria, could result in slower biological degradation of hydrocarbons in the Arctic.

Another factor that can explain the vulnerability of the Arctic is the extreme seasonality found there. Long winters and brief summers restrict many important activities for Arctic species into the short summer. For many aquatic species, feeding, breeding, mating, and raising young need to happen in a brief window of opportunity in open water (WWF Canada, 2014). The result is that species, including marine mammals, birds, and fish that are vulnerable to oil pollution are highly localized and seasonally more abundant in open water during the high shipping season or near resource extraction sites (Gulas et al., 2017), creating the potential for additional impacts to marine mammals from Arctic ships such as ship strikes, disruption of migration patters, and noise impacts (Arctic Council, 2009).

Profound changes have come to Arctic Canada in recent decades. Increased economic activity, tourism, globalization, and climate change are all driving forces behind increases in Arctic shipping (Ocean Conservancy, 2017). This will impact arctic ecosystem and Arctic communities alike. As suggested by Wilkinson et al. (2017), we are unable to truly understand the effects that a large-scale fuel spill would have in the Canadian Arctic. The potential consequences of an oil spill to communities in Nunavut and Inuit residents could profoundly disrupt human activities and cultural ways of life. According to DeCola et al. (2017), Ocean Conservancy (2017), and Pizzolato et al. (2014), land based cultural activities, food and water sources, and cultural connections to the land could all be at risk.

2.1.2 Pollution from ships

It is important to note that oil and other pollutants do not only end up in the oceans through large spill events. Lindgren et al. (2016) found that of global fuel discharges to the ocean, 34% are from ships. Only 9.8% of discharges are outcomes of accidental spills as a result of events such as groundings, collisions or explosions that release enormous amounts of oil. Instead, operational discharges from routine operations are the largest source of oil discharges to the sea from human activity, responsible for about 24% of the total global discharges (Lindgren et al., 2016).

Operational discharges, like untreated bilge water, cleaning of tanks, and bunkering are responsible for the majority of small oil spills, and small continuous leaks are common on older ships. Small leaks can come from propeller shaft bearings for example, which need to be lubricated continually, and may begin to leak as shaft seals wear down and harden over time (Lindgren et al., 2016). According to Lindgren et al. (2016), even though the International Maritime Organization (IMO) has taken steps to reduce these impacts, like requiring separated ballast tanks and bilge water treatment equipment, problems still exist. Lindgren et al. (2016) suggest that human error and technical factors are often the cause of vessel accidents and that the lack of enforcement in global shipping is a gap that needs to be addressed.

Whether from large accidental events or small continuous discharges from routine operations, shipping is accompanied by some level of pollution. The risk of pollution can therefore be understood as a function of the amount of shipping in a region, and an increase in shipping levels in a region also represents an increase in the risk of pollution (Wilkinson et al., 2017).

In a study evaluating the risk of oil spills in Canadian waters, Marty et al. (2016) define the risk of oil spills as a function of the sensitivity to a spill in a region relative to the probability of a spill in that region. To determine this risk across the Arctic, Marty et al. (2016) applied an Environmental Sensitivity Index across 18 subsections of the Canadian Arctic, combining the potential physical, biological, and human use impacts from an oil spill along with the frequency and type of shipping traffic through each subsection to quantify the spill risk in each area. The study suggests that there is a large variation in risk across the 18 arctic subsections, but that the southeastern Artic generally shows the highest risk values. For example, the Labrador Sea falls into the highest risk category, while the Hudson Straight, and North Hudson Bay subsections fall into the second highest category. In all regions it was found that spills are most likely to occur near the coastline, where local communities are situated and most people are active (Marty et al., 2016), which related to the findings of Dawson et al. (2018), who showed that shipping for resource extraction projects has already greatly increased the shipping in close proximity to local communities.

2.1.3 The challenges of Arctic shipping

Fundamental to the challenges facing the shipping industry in Canada's Arctic are the environmental conditions found there. The International Code for Ships traveling in Polar Water (Polar Code) was established by the IMO in 2015, and identified 10 Arctic-specific shipping hazards, which underline the need for specific regulations for ships in Arctic waters (IMO, 2015). These hazards include:

- The presence of ice: affect ship structure, stability, machinery, navigation, emergency preparedness, and may cause malfunctions;
- Low temperatures: affecting the working environment and human performance, survival time, and performance of safety equipment;
- Extended periods of darkness: presenting challenges for navigation and human performance;
- High latitude: affecting navigational and communication systems, and quality of ice imagery;
- Remoteness and lack of accurate or complete hydrographic data: resulting in potential groundings, limited search and rescue facilities, delays in emergency response, and limited communications;
- Lack of human capacity: ship crew experience and knowhow;
- Potential lack of suitable emergency response equipment; and
- Rapidly changing and severe weather conditions (IMO, 2015).

These conditions all factor into the difficulty of safe navigation of Arctic waters, and are echoed in the challenges and shortcomings of the fuel spill response regime in the Arctic (DeCola et al., 2017; Molenaar, 2009; Vard Marine, 2015; Wilkinson et al., 2017).

2.1.4 Oil spill mitigation and response options

Shipping regulations such as the Polar Code and Canada's domestic laws attempt to be proactive, by addressing the risks of fuel spills before pollution events occur (Thorsell & Leschine, 2016). These laws regulate what type of ships can enter Arctic waters, what components and features the ships need to have, and attempt to ensure that certification and experienced crews are present in order to avoid oil spills (Kraska, 2015). When an oil spill event does occur, the options for the retrieval of the oil are extremely limited and can be severely inhibited by environmental conditions and the geographic limitations in the Canadian Arctic, as described in Section 2.1.3.

The following response strategies fall into two broad categories, each attempting to mitigate the impacts of oil in the marine environment. The first set of responses attempt to physically remove oil from the environment, while several other strategies leave oil in the environment and attempt to manage the impacts through chemical dispersants or natural attenuation.

Mechanical recovery is the term used for response strategies that physically remove oil from the environment. Mechanical recovery requires large floating booms pulled by ships to contain the spilled oil and keep it from spreading, allowing skimmers to draw up oil through suction, or for oil to be removed by absorbent materials. Mechanical recovery requires storage tanks with enough capacity to recover the fuel and extra fluids (Wilkinson et al., 2017). While this strategy can effectively remove oil from the environment, it has several drawbacks. Mechanical recovery is dependent on a timely response to a spill, before the oil has a chance to disperse, and is limited severally by environmental conditions such as visibility, waves, temperature, and the presence of sea ice. It requires gear and infrastructure to be in working order and people able to use the gear in a timely manner (DeCola et al., 2017).

Another method of physical removal of oil is in-situ burning. In-situ burning can remove a large amount of oil from the environment, but may create other negative impacts such as heavy smoke or may leave heavy oil residues that may sink into the water column. In-situ burning may be an effective way for oil to be partially cleaned up when ice-cover does not allow for the use of booms and mechanical recovery (DeCola et al., 2017; Wilkinson et al., 2017).

As an alternative to physical recovery, spill treating agents such as chemical dispersants or washing agents can be used to address fuel spills. According to WWF Canada (2017b), dispersants can effectively be used in marine fuel spill response by breaking up the oil in a floating slick into smaller droplets, helping the oil disperse into the water column where bacterial and microbial organisms can further degrade the oil. Lewis and Prince (2018) suggest that dispersants can be especially effective when attempting to respond to a spill a great distance from existing response infrastructure. Just as with physical recovery, the timely application is a necessary since oil that has weathered for several days will no longer disperse as effectively (DeCola et al., 2017; Lewis & Prince, 2018). The only chemical dispersant approved for use in Canadian waters is Corexit 9500, but the potential toxic side effects remain an area of concern (Logan & Genovali, 2018). Logan and Genovali (2018) suggest that Canada rushed into the approval of this product without any certainty of its effectiveness.

The final option mentioned by WWF Canada (2017b) is to take no action and leave the spill for natural hydrocarbon degradation. As oil is a naturally occurring material, oil degrading bacteria are ever-present and highly specialized to use hydrocarbons as energy sources (GENICE, 2016). Dispersants may be used to aid natural recovery by lowering the concentration of the spill, but remediation of the fuel would be left to natural biodegradation by organisms and bacteria. In certain environmental conditions this may be the only option, or it may be chosen if it is determined that response actions may further damage the marine environment (DeCola et al., 2017). The GENICE project will attempt to expand the knowledge about the extent and viability of bioremediation as a spill response strategy in the Canadian Arctic (GENICE, 2016).

In the event that a spill occurs near a shoreline, or that oil is washed to shore, there are several cleanup processes used to reduce the impact. Surface-washing agents similar to dispersants can be used to remove the oil, while other procedures involve manual and mechanical removal of oil, washing or flushing of oil with water, steam, or sand, and surf washing to accelerate natural degradation of oil, and chemical treating agents (DeCola et al., 2017). DeCola et al. (2017) suggest that shoreline cleanup presents a particular challenge for Arctic oil spill response and that Geographic Response Plans are needed to guide the protection of shorelines.

As these cleanup strategies suggest, the environmental and geographic conditions in which the spill occurs are important in determining the fate of oil in the marine environment. In addition, the type of oil spilled also determines which response strategies are possible. Oils are generally classified into five groups by their specific gravity. Lighter oils, like marine diesel (group 2) are extremely toxic to wildlife, but are volatile, easily dispersed, and broken down by bacteria relatively easily. While they cause immediate harm to a marine system, they do not persist in the environment as heavier oils do (DeCola et al., 2017).

Heavier oils on the other hand, are much less volatile but they may persist as oily mixtures of water and tar for a long time, with long-term environmental consequences. Heavy fuel oils (HFOs) are group four oils, and are regarded as the most harmful fuel types used in the Arctic since they are difficult to cleanup or disperse and are particularly harmful since they tend to persistent in the environment (DeCola et al., 2017).

Other important factors that help determine the impacts and the spill response are the quantity of oil spilled and the location of the spill. The location is important since impact of a spill will be higher if it is near a community, cultural site or important ecological or biological area. The quantity of oil spilled will also importantly help determine the severity of the spill and the need for a response (DeCola et al., 2017).

Environmental conditions are a significant challenge to oil spill response plans since they offer a number of variables that cannot be planned for. Extreme temperatures, wind, waves, tides, and seasons of prolonged darkness all contribute to the tough task of oil spill response by limiting human capabilities and the effectiveness of response gear (DeCola et al., 2017; IMO, 2015).

Exposure to environmental conditions can also change the physical and chemical properties of oil and affect its fate in the marine environment. This process is called weathering and can create a host of problems for spill response. Weathering can cause evaporation of lighter fuels, leaving more harmful particles behind; emulsification, making oil and water harder to separate, and causing oily clumps to sink in the water column; dispersion into the water column; oxidation, creating water-soluble clumps near the edges of spills; and spreading, causing the enlargement of the spill area (DeCola et al., 2017).

Finally, another significant variable determining the possibility of an oil spill cleanup are the sea ice conditions. The presence of sea ice can complicate the persistence of spilled oil, especially if a spill occurs as sea ice is forming. Oil trapped in ice, absorbed by snow, pooling on top or under sea ice can prolong the effects of an oil spill by releasing oil into the environment over more time and over much greater distance, as ice may transport oil as it moves with the currents (DeCola et al., 2017).

The preventative mitigation and response strategies described in this chapter play an important role in the Canadian regulatory and emergency response regime. The reality is that the capacity for oil spill clean up post spill is small (DeCola et al., 2017; Wilkinson et al., 2017), and therefore response plans are generally tailored to reducing the chances of discharges (DeCola et al., 2017; Kraska, 2015), and protecting ecologically significant areas and shorelines in case of a spill (Wynja et al., 2015).

2.2 Canadian Shipping Regulations and Emergency Response Plans

Several important pieces of Federal legislation and multiple international conventions create a patchwork of rules and regulations through which Canada strives to maintain orderly and safe shipping practices, guard Canadian waters, and prepare for emergencies. Transport Canada (TC) and the Canadian Coast Guard (CCG) are the two Federal agencies most directly responsible for shipping regulations. TC has authority over shipping legislation and drafting regulations, while the CCG is an operational agency responsible for the implementation and enforcement of these regulations (DeCola et al., 2017).

A closer look into oil spill response protocols in Arctic Canada suggests that governance over shipping is a much more integrated and complex subject than simple federal jurisdiction. In the case of Nunavut, significant power to influence shipping practices is given to the land use planning provisions through the Nunavut Land Claims Agreement (NLCA), and to Fisheries and Oceans Canada (DFO) through the creation of shipping safety zones. Especially with regards to Arctic oil spill response plans, coordinated efforts between many different actors and organizations is crucial (DeCola et al., 2017).

2.2.1 International maritime conventions

According to Steigelman (2017), "Canada has led the way in creating powerful, targeted anti-pollution laws that relate specifically to arctic waters" (55).
The most significant of these are the Canadian Shipping Act 2001 (CSA), which specifies Arctic protocols, and the Arctic Waters Pollution Protection Act (AWPPA) (Transport Canada, 2010). These two pieces of legislation also represent Canada's

commitments to the IMO, as they are modeled after important international conventions to which Canada is a signatory. The three most important IMO conventions that have established the direction for Canada's shipping legislation are:

- the International Convention for the Prevention of Pollution from Ships (MARPOL), specifically the section on Pollutant Substance Pollution Prevention, which is addressed throughout the CSA (Transport Canada 2010);
- the International Convention for the Safety of Life at Sea (SOLAS), which applies throughout Canadian shipping legislation and regulates all aspects of shipping safety such as speed of travel, carriage of dangerous goods and safe operations (Transport Canada, 2010); and
- the International Code for Ships traveling in Polar Water (Polar Code), which is addressed by newest regulations in the AWPPA and creates Arctic specific regulations (Transport Canada 2018).

In addition to these IMO conventions, the United Nations Convention of the Law of the Sea (UNCLOS) is another important international agreement. Steigelman (2017) refers to it as the "foundational treaty for international maritime law" (51), as it establishes many aspects of international maritime conduct, such as creating the precedent for the governance zones of the ocean. UNCLOS defines a coastal state's territorial sea as the first 12 nautical miles (nm) off its coastline at low water and the exclusive economic zone (EEZ) up to 200nm beyond that. A coastal state has jurisdiction over resources and shipping regulations in its EEZ (Steigelman, 2017). Additional specific provisions are included that relate to ice-covered waters. These provisions allow countries to enforce additional regulations designed to prevent and reduce pollution in ice covered waters within a nation's EEZ (Ocean Conservancy, 2017).

These four conventions have dictated much shipping legislation throughout the world. Canadian legislation has also resulted due to these conventions, such as Canada's first claim to the full 200nm EEZ in the Arctic region as allowed by UNCLOS through the Northern Canada Vessel Traffic Services Zone Regulations (NORDREG) in

2010 (Kraska, 2015), and the AWPPA that addressed many of the concerns discussed regarding UNCLOS (Steigelman, 2017).

2.2.2. Arctic shipping safety regime

Broadly speaking, Canada's shipping regulations and oil spill response regime for the Arctic is based on banning pollution, enforcing strict liability, monitoring ship travel, excluding ships from important areas, and coordinating response to emergencies. The following section outlines each of these components.

Since the MARPOL convention does not address waters north of the 60th parallel, Canada has addressed the specific concerns of Arctic shipping through the AWPPA since 1970. This legislation defines Arctic waters as north of the 60th parallel and east of 141 degrees west, prohibits dumping of any wastes into the marine environment, and necessitates a reporting procedure for instances of potential pollution (Steigelman, 2017). VanderZwaag & Lamson (1990) describe three ways in which this legislation controls pollution. It makes the discharge of waste a punishable offence with stringent fines, makes ship-owners and operators liable for pollution damages, and controls shipping in fragile or challenging regions by creating shipping safety control zones.

Since 1970, the AWPPA has been amended several times. Most recently, new Artic Shipping Safety and Pollution Prevention Regulations were added in 2017. These new regulations incorporate the Polar Code into Canadian legislation. The Polar Code addresses the unique hazards present when shipping in the Arctic and sets standards for vessel design and equipment, operations and training, and for the protection of coastlines and responsible shipping in Arctic water (Transport Canada, 2018).

The Polar Code was established to address additional risks of Arctic shipping that were not included in previous IMO conventions. The Polar Code requires all ships of at least 500 GT travelling in Arctic waters to have a valid Polar Ship Certificate on board. This certificate is granted upon performance standards and an operational assessment, and specifies a polar ice class for each vessel. Ice-strengthened double hulls, separated ballasts and ship structure specifications in low temperatures are required, as is the watertight integrity of the ship and machinery to deal with weather conditions such as snow build up. In addition, emphasis is put on human preparedness and crew experience (IMO, 2015; Ocean Conservancy, 2017). These regulations should apply to all mine related shipping, including bulk carriers and supply vessels as per the Polar Ship Certificate requirements (Transport Canada, 2018).

Ship monitoring and tracking is the next approach taken to help tackle the risks involved with Arctic shipping. As part of the Canada Shipping Act, the NORDREG generate a ship reporting procedure central to Canada's Arctic shipping safety regime. Compliance with these regulations is mandatory throughout the NORDREG Zone, which includes all of Canada's claimed northern waters (Kraska, 2015). All ships over 300 GT entering Canadian Arctic waters are required to report their geographic position to the CCG Marine Communication and Traffic Services centre, which is based in Iqaluit. In addition, an Automatic Identification System is used to track, locate and identify vessels, though they cannot be tracked in real time (Ocean Conservancy, 2017; WWF Canada, 2017). Mjelde, Martinsen, Eide, & Endresen (2014) suggest that monitoring ship traffic is an important task because it makes a wealth of shipping data available. Ships must report their speed, direction and destination, and this data can be combined with cargo and ship databases allowing for oil spill risk, emissions, and pollution impacts to be modeled accurately. According to WWF Canada (2017), this type of data collection is an important task which enables the creation of an adequate response regime.

The creation of Shipping Safety Control Zones is another important mechanism for monitoring ship access to important marine zones. As part of NORDRED, Canadian authorities can create these zones to protect important ecological sites, or aid ships navigating through challenging or hazardous areas, and specify what ships can enter these zones and what the physical requirements of ship are in order to enter (Kraska, 2015).

Additional zones with strict shipping and vessel regulations are created through the land use planning provisions of the Nunavut Land Claims Agreement (NLCA). The 1993 NLCA is the foundation for land and wildlife policy, activities and developments in the Nunavut Settlement Area, and gives a wide set of powers to the

Government of Nunavut (GN) and Inuit organizations in these areas. A Nunavut Land Use Plan (NLUP) for the entire settlement area is still being developed, and will replace the existing smaller regional plans, including the North Baffin Regional Land Use Plan and the Keewatin Regional Land Use Plan. These two regional plans help govern shipping activities and response plans. For example, the North Baffin Regional Land Use Plan determines access to marine areas and requires meetings between CCG and communities to discuss shipping concerns (DeCola et al., 2017), while prohibiting ships from coming within 10km of coastlines in the region and keeping ships 25km from Lancaster Sound, a unique and important ecological area (WWF Canada, 2017). According to WWF Canada (2017), the upcoming NLUP will help create more certainty with shipping off the coast of Nunavut by creating shipping corridors and prohibiting shipping within important ecological zones.

2.2.3 Canada's Arctic spill response regime

Canada's Arctic Spill Response Regime is an extension of some of the mechanisms described above, and requires many different organizations and agencies from different levels of government to work together. Canadian shipping laws require all ships to contract response organizations to provide cleanup in case of an oil spill (up to 10,000 tones of oil). However ships travelling in Arctic waters are exempt from these provisions since no private response organizations exist in the Arctic (WWF Canada, 2017). For this reason, a coordinated response between the different levels of government and the polluter has been established for Arctic waters. What follows is a brief explanation of the different actors in oil spill response in the Eastern Arctic.

Transport Canada (TC) is the leading Federal agency in Canada's Marine Oil Spill Preparedness and Response Regime. TC sets guidelines and the regulatory structure for preparedness and response to marine spills and is responsible for ensuring the appropriate level of preparedness is available in the event of an emergency (WWF Canada, 2017).

The CCG is the next most important federal agency in the Oil Spill Preparedness and Response regime. As part of the Emergency Management Act the CCG develops and maintains national, regional, and local area oil spill response plans, conforming to guidelines and regulations of TC and the National Marine Spill Contingency Plan (WWF Canada, 2017). Since there are no response organizations available above the Arctic Circle, the CCG is the primary entity responsible for managing and carrying out spill response if the polluter is unavailable or unable to respond (DeCola et al., 2017).

Additional federal agencies of importance for spill response include Environment and Climate Change Canada (ECCC), the Canadian Wildlife Service, and DFO. These organizations have broad mandates and create policies focused on wildlife, including response plans for marine animals and birds affected by oil spills. DFO plays an important role in the establishment of Ecologically and Biologically Significant Areas, drawing attention to the protection of these areas that have especially high biological and ecological significance (DeCola et al., 2017).

According to WWF Canada (2017), the Ocean Protection Plan (2016) will help strengthen all areas of the Marine Oil Spill Preparedness and Response Regime. As part of the Ocean Protection Plan the Federal Government will invest $1.5 billion into a series of initiatives around marine safety and shipping. These initiatives include several projects in Arctic Canada focusing on marine safety, search and rescue, surveillance and vessel monitoring, research and science, coastal restoration, increase CCG support and investments in emergency preparedness. Some of these Arctic initiatives are partnerships with Indigenous communities, while most are engagements with other levels of government, and coordination between TC, the CCG and DFO (Transport Canada, 2019).

2.2.4 Nunavut specific policies

Several organizations and agencies in Nunavut are active in oil spill response and community protection. Inuit organizations such as the Nunavut Tunngavik Inc. (NTI) and the three Regional Inuit Associations play a role, while the Nunavut Marine Council advises and makes recommendations to other government agencies regarding the marine waters of Nunavut Settlement Area (NSA) (DeCola et al., 2017).

In the case of an emergency, several Government of Nunavut (GN) agencies play important roles in the response effort. The Department of Environment (DoE) is responsible for preparedness and response for land-based and coastline spills. The

DoE is comprised of several important divisions, such as the Environmental Protection Division, which enforces Canada's Spill Contingency Planning and Reporting Regulations, and the Petroleum Products Division, which helps develop emergency response plans for oil handling and storage facilities in Nunavut (DeCola et al., 2017). Other important agencies play roles in the coordination of spill response, such as the Northwest Territories/Nunavut Spills Working Group. This interagency group provides coordination for spill reporting and response (WWF Canada, 2017).

According to Steigelman (2017), the existing spill response regime is a haphazard combination of available actors and liability regulations. WWF Canada (2017) describes how communities and local organizations, GN and federal agencies, responsible parties, and response organizations if applicable, all work together in the case of an emergency. National plans implemented by TC and CCG, Regional Arctic response plans, and more specific plans such as Baffin Region Area Response Plan all theoretically fit into the overarching response regime (DeCola et al., 2017).

In more practical terms, the roles in the mitigation and response regime are summarized as follows. The development of response plans for individual ships and oil-handling facilities is the responsibility of industry. Shipping companies are required to develop Shipboard Oil Pollution Emergency Plans (SOPEP) if they meet the size requirements (150 GT for tankers, 400GT all other vessels), and oil-handling facilities in Nunavut have spill and response plans developed by the Petroleum Products Division (DeCola et al., 2017).

For local and regional oil spill response, the CCG maintains community response gear in coastal communities, which includes the basic response gear needed for a near shore spill of up to a tone of oil. Larger stocks of equipment are maintained in regional centers meant to be deployed as needed (DeCola et al., 2017). Local plans are important and helpfully complement regional plans by providing additional information in a local setting. They can help define the roles of local government and communities, create local priorities during oil spills and implement site-specific protection plans. They should help assess the capabilities and gaps in response abilities, incorporate local and traditional knowledge, and create forum for local and traditional knowledge to effect decision-making (DeCola et al., 2017).

2.2.5 Gaps in the response regime

There is agreement in the literature that the ability to respond to oil spills in the Arctic is severely limited and significant gaps in spill response planning in the Arctic leave the Canadian North vulnerable in the event of a large spill (Arctic Council, 2009; DeCola et al., 2017; Gulas et al., 2017; Vard Marine, 2015; WWF Canada, 2017). The shortcomings in spill response planning in the Canadian Arctic can be placed into the following categories, describing gaps resulting from environmental conditions, remoteness, lack of research, insufficient technical ability, and the complexity of the governance framework.

The physical environment poses many problems for spill response. As mentioned earlier, the physical strain on people and equipment in extreme temperatures infringes upon their abilities (WWF Canada, 2017), and the prevalence of sea ice, prolonged darkness, and poor visibility, create difficult navigational conditions which present enormous challenges for safety and spill risk mitigation (Vard Marine, 2015).

Several important shortcomings of the current response regime are the product of the vastness and remoteness of the region. While there are strict response time standards in Canadian waters below the Arctic Circle, such as 6 hours after a spill up to 150 tones, the response standards above the Arctic Circle are far less stringent, requiring 48 hour and seven day response times for large spills (WWF Canada, 2017). Without the ability for swift responses, many of the approved response strategies, such as mechanical removal or in-situ burning are no longer viable options (Wilkinson et al., 2017), and late responses may be inadequate to address impacts to the marine environment and biodiversity (Molenaar, 2009).

Canada's limited fleet of ice breaking coast guard vessels is another shortcoming, given the vastness of the Canadian Arctic. Stewart and Dawson (2011), while describing cruise ship traffic in the region, explained how disaster was averted as one of the three CCG ice breakers happened to be at close by as the *Clipper Adventurer* went aground in the Northwest Passage in 2010. It was good fortune that prevented disaster, as the CCG could just as easily have been thousands of kilometers away and unable to respond in short order.

In addition to pointing out the lacking presence of the CCG in Arctic Canada, Stewart and Dawson (2011) point out significant gaps in the navigational charts in the Arctic. This lack of information also extends to marine safety information (Molenaar, 2009), shoreline information required for effective shoreline cleanup (Wynja et al., 2015), incomplete knowledge of baseline environmental and wildlife data (Gulas et al., 2017; Wilkinson et al., 2017), an inadequate ability to model the fate of oil spill in the Arctic marine environment (C-CORE, 2013), and the fact that the impacts of contaminants are not well understood (Vard Marine, 2015; Wilkinson et al., 2017).

The lack of Arctic marine infrastructure as a whole, poses questions for spill response and emergency preparedness in the region. The inability to move equipment and people in the case of an emergency and the limited communication equipment are cause for concern (Ocean Conservancy, 2017; Wilkinson et al., 2017). DeCola et al. (2017) and WWF Canada (2017) found significant capacity limitations when addressing the community response packages that the CCG maintain in coastal communities. Their findings suggest that the equipment is inadequate, that maintenance is inconsistent, and that gear has been found in a non-working state. Additional questions remain, such as who maintains access to the gear, and how it would be deployed in a response scenario. Further, the complete lack of hazardous waste facilities means that the degree to which a large oil spill could be contained would be severely limited by the lack of equipment capable of separating oil, water, and ice and the limited storage capacity for recovered oil and residues in the Arctic (C-CORE, 2013; Laidre et al., 2015). Finally, WWF Canada (2017), suggests that in addition to infrastructure shortcomings there are also gaps in the human capacity and knowhow to deal with a spill. Trained community members are needed for the event that a spill needs to be dealt with before the CCG can respond.

The publications cited in this section offer many recommendations, such as the need for NLUP to establish protected areas, special management areas, and mixed use areas (WWF Canada, 2017), the need for real time ship tracking data such as the AIS to be expanded to be able to aid in oil spill response (C-CORE, 2013), and the general need for more well defined local response plans that show priority sites to be protected in case of a spill (DeCola et al., 2017; WWF Canada, 2017; Wynja et al., 2015).

2.3 Impact Assessment

Environmental Impact Assessment (EIA or EA), referred to in this chapter simply as impact assessment (IA), is the process through which the environmental impacts of a proposed development project are assessed in order to decide whether and how to pursue the project. Important steps that are generally included in the IA process include establishing the parameters of the project, generating technical knowledge on the impacts, allowing for local and citizen participation, and creating mechanisms or procedures to mitigate the impacts of the project (Noble, 2015).

The general explanation of the IA process above can be expanded in a number of ways, as there are multiple perspectives on what the function or purpose of IA should be. These variations emphasize IA as a mechanism through which environmental concerns and/or public concerns are able to enter the decision-making process in the resource extraction sector (Noble, 2015), focus on IA as a space of democratic decision making, giving voices to many different citizens (Sinclair & Doelle, 2015), and as a knowledge generating tool and an analytical method, allowing projects to go ahead with the full knowledge of their environmental, social, and economic impacts (Hanna, 2016). These different themes within the IA process help demonstrate the multiple goals and functions of IA.

According to Andersson et al. (2016), IA is not commonly used for managing shipping practices and shipping impacts, but Gulas et al. (2017) suggest that IA has the potential to carry out important tasks to better understand shipping impacts, such as establishing baseline conditions, quantifying the risks of Arctic development, and improving pollution prevention and spill response regimes by creating a space for cooperation between stakeholders. In shipping infrastructure developments such as port facilities, Andersson et al. (2016) suggest that the permit processes must include shipping activities in order to get the full picture of potential impacts, including increased traffic, discharges, emission to the atmosphere, and noise from engines. The same argument can be made for the inclusion of shipping activities and their impacts IAs of mining developments in Nunavut.

The 2009 Arctic Marine Shipping Assessment made similar assertions about the assessment of shipping impacts, suggesting that as shipping levels in the Arctic continue to increase on a seasonal basis, potential environmental and ecological impacts are amplified and must be taken into account in project planning and decision-making. Further, the report suggests that Arctic countries must decide what constitutes acceptable levels of risk (Arctic Council, 2009). IA with scientific inquiry and local participation can be a tool to help negotiate consensual development, and determine what levels of risk are acceptable given how the benefits of a project might be shared (VanderZaag, 1990) .

2.3.1 The impact assessment process

IA processes generally follow a few basic stages. Most commonly these stages are: screening, scoping, impact predictions and management, decision-making, and post-decision monitoring.

The screening stage begins when a project proposal is submitted to an IA authority and determines if a project proposal requires an IA and to what extent (Noble, 2015). If the screening stage suggests the need for an IA, then the scoping phase can begin.

The scoping stage is used to determine the issues and concerns that should be addressed in the IA, as well as establishing the spatial and temporal boundaries of the assessment. Important requirements of the scoping stage include the identification of project alternatives as a way of justifying the need for the proposed project; identification of alternative means, methods, or designs for carrying out the project; and establishment of valued environmental components (VECs) as indicators of change in the environment (Noble, 2015). Lamberg (1990) suggests that IA is uniquely positioned to function within the physical and economic boundaries of a project, but also to take the environmental boundaries, such as ecological and technological realities, and administrative boundaries, such as political, social and economic realities into account. In the context of Arctic shipping, how the scoping step was carried out has implications for the rest of the IA.

The third stage of a general IA process involves the prediction of environmental impacts. According to Noble (2015), making good predictions requires three data points. It requires knowledge of initial baseline conditions, predictions of future conditions and trends in the presence of the development, and predictions in the absence of the project. The impacts of a project are then determined by comparing predictions of future conditions with and without the proposed project. By 'impacts,' all biophysical effects, including biological, chemical and physical changes, as well as effects on the human environment, including demographic, cultural, economic, health and institutional changes are meant. Predicting impacts is complex, uncertain, and according to Noble (2015), "rarely done well" (p. 120). Nonetheless, this is an important stage in the IA process as the risk, likelihood, and significance of impacts to the human and natural environment are needed in order to quantify and address the full impact of a development project (Noble, 2015). Generally it is understood that the likelihood of a spill is very low, while the potential consequences of a spill are very high (Afenyo, Khan, Veitch, & Yang, 2017), and while modeling techniques have improved significantly in recent years, many unknowns remain about the true impact of oil spills in the Arctic (Wilkinson et al., 2017).

The fourth step in the common IA process is managing project impacts. Noble (2015) describes a hierarchy of management strategies, starting with the most desirable outcome, avoidance. Setting regulatory standards, and scheduling construction around environmental occurrences are examples of avoidance. However, since not all impacts can be avoided, the next most desirable strategy is mitigation. Mitigation involves management principles and decisions to minimize potential adverse impacts. Third in the hierarchy is remediation, referring to the restoration and rehabilitation of environmental features in cases where avoidance and mitigation are not possible. The fourth strategy for managing impacts is compensation, which can take monetary or other forms, but is used when unavoidable or irreparable impacts have taken place without other management alternatives. In addition to these four management approaches, the creation of benefits to local communities must also be defined at this stage of an IA to help justify the project (Noble, 2015).

Next, the IA process leads to a final report on the findings with recommendations for decision-makers. Ultimately a high level of discretion is often left to the decision-makers, who must approve or deny the proposal (Noble, 2015).

After a decision regarding a project, the IA process continues to monitor the impacts of a project in the follow-up and monitoring stage. Noble (2015) describes how monitoring the impacts of a project post construction changes the IA process from a linear one, to an iterative process where successes and failures of the management strategies implemented through the IA can be incorporated back into the management strategies. Components of this stage include monitoring environmental conditions to collect data, auditing to determine compliance with standards and expectations, and making adjustments to management strategies based on outcomes found (Noble, 2015).

The steps described above represent a general IA process. Across jurisdictions there are many different approaches and strategies to individual IA processes, but according to Noble (2015), there are some important operating principles that apply across the board. These include that IA should be applied as early as possible in the planning stages, and to all proposals that may generate significant adverse effects or about which there is significant public concern. Additionally, IA should address all biophysical and human components that could be affected, and should be applied consistently, in such a way that allows for the involvement of interested and effected parties, and in accordance with regulatory requirements.

2.3.2 IA in Canada

According to Hanna (2016), IA is one of the most influential and constant components of environmental regulation in Canada. Even though IA is a regulatory requirement across the country, the Canadian IA regime takes on a certain complexity based on the way that the federal and provincial governments share jurisdiction over resource extraction. Control and development of natural resources falls into provincial jurisdiction, but no absolute control over environmental issues is assigned to either level of Government, resulting in shared jurisdiction over environmental protection. For this reason there are numerous different and overlapping IA processes that vary considerably throughout Canada (Fitzpatrick & Sinclair, 2016).

The scope of projects requiring federal IA is limited to projects that affect federal jurisdiction, impact federal lands, create interprovincial environmental impacts, or create potential effects on the health and socioeconomic conditions, physical and cultural heritage, or current use of lands and resources for traditional purposes by Indigenous people (Noble, 2015).

According to Noble (2015), IA in northern Canada is generally more variable than in the provincial context, as it is often a mixed system of federal jurisdiction and federal-territorial agreements under several Indigenous land claims and co-management boards.

2.3.3 Impact assessment in Nunavut

Barry, Granchinho, and Rusk (2016) suggest that Nunavut has one of the most unique IA frameworks in Canada. Nunavut's IA process was established in the Nunavut Land Claims Agreement (NLCA), signed in 1993. The NLCA was negotiated between the Government of Canada and the Tunngavik Federation of Nunavut and laid the foundation for the creation of Nunavut as a Territory and its governance structures (Barry et al., 2016).

The NLCA is a modern treaty, and gave land title to specific areas and control over resource rights to the Inuit, in exchange for the surrender of any future land claims in the region. Several objectives of the NLCA include to protect and foster Inuit ways of life, language and control over resources (Dylan, 2017). The NLCA established a consensus based public government, and five institutions of public government (IPG) to oversee the management of land and resource within the Nunavut Settlement Area (NSA). The Nunavut Impact Review Board (NIRB) is one of these institutions and has exclusive jurisdiction over IA in Nunavut (Barry et al., 2016).

The Nunavut IA process is described in NLCA. Article 11 describes land use planning and the role of the Nunavut Planning Commission (NPC), while Article 12 describes the IA process and the role of the NIRB (Barry et al., 2016). The Nunavut

Planning and Project Assessment Act (NuPPAA) officially established these bodies in Canadian Federal Law in 2015 and created a legal basis for many of the provisions of the NLCA, like the cooperative framework between the Federal Government and the IPGs (Barry et al., 2016). In the event of any discrepancy between these two documents, the NLCA maintains primacy (Dylan, 2017).

According to Sinclair and Doelle (2015), one of the ways in which the IA process in Nunavut is unique is that it links IA and land use planning in a way that is not seen in provincial IA process. Generally, land use planning is separate from IA and falls into municipal jurisdiction. In Nunavut, compliance to applicable land use plans precedes an IA. A Nunavut wide land use plan has been in the making for over a decade now, as hearings and negotiations have been ongoing since 2007. The Nunavut Land Use Plan (NLUP) is now entering its fourth draft, scheduled for 2022. The NTI, NPC, GN and Industry representatives could not agree to the third draft in 2018 (Frizzell, 2018).

Since the Keewatin Regional Land Use Plan and the North Baffin Regional Land Use Plan are the only two active land use plans for projects to adhere to (Barry et al., 2016), the NIRB has a much larger mandate than most equivalent agencies in the country. In the case that a project falls outside of the two active regional land use plans, NIRB is tasked with gauging the impacts of the development on the region the way a land use plan would before beginning the IA process (Sinclair & Doelle, 2015).

2.3.4 NIRB and the IA process

The first step in the Nunavut IA process is the submission of a project proposal to the NPC. The NPC decides if the proposal conforms to any applicable land use plan, and based on adherence to such a plan, determines if the proposal is exempt from an IA by NIRB or if screening is required. The NPC forwards its conclusion as a recommendation to the 'responsible government minster' before it is sent to NIRB for the initial assessment and screening (Barry et al., 2016).

It is important to note that the responsible minister in most cases is the federal minister for Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC, formerly INAC and AANDC). This is in part due to the fact that even after the NLCA the majority of the land in the Nunavut Settlement Area is crown land. Dylan (2017) specifies that the Inuit have title to only 19% of the land in Nunavut and control only 2% of the subsurface mineral rights. Ministerial approval is also required on Inuit owned lands, and the federal minister has the discretion at this point in the process to decide if the proposal will go to NIRB or if more information is needed from NPC. The Federal Minister also has the power to grant land use plan exemptions (Dylan, 2017).

Once NIRB receives the project proposal from the NPC an initial assessment and screening can begin. In order to begin the initial assessment, NIRB has a 45-day period to assess the proposal for completeness before distributing the proposal for public comment. The comment period, lasting between 10 and 21 days, allows the public to share concerns and local knowledge with regards to the proposal. Following this step, NIRB completes a technical assessment of the proposal and determines whether a given project poses significant impact potential. The NIRB members vote and issue a screening decision report to the responsible Minister (Barry et al., 2016).

NIRB has four available determinations as the conclusion to the screening process. The NIRB can recommend that the proposal, (a) is approved with terms and conditions, (b) requires a review (Part 5 or 6), (c) is insufficient for proper screening and is returned for clarification; or (d) must be modified or abandoned due to unacceptable or unjustifiable potential impacts (Barry et al., 2016).

One of these four options is recommended by NIRB to the responsible minister, who reserves the decision-making power to uphold NIRBs recommendation, or to decide against NIRBs recommendation in the concern of "regional or national interest" (Dylan, 2017).

There are two possible review process options if the responsible minster rules that a review is required. Article 12 of the NLCA describes the NIRB-led review (referred to as a Part 5 review) or a federal panel review (Part 6) (Barry et al., 2016). The most common process option is a Part 5 review, which begins with a common scoping stage. The potential environmental impacts are established, alternative means are considered, the effects of the project on sustainable use of resources is analyzed, and mitigation measures to be discussed in the IA process are presented. These are all common features of a scoping phase, however as part of a NIRB review, an emphasis on early and full involvement of Inuit and other residents is an important feature. The scoping stage results in Environmental Impact Statement (EIS) guidelines, which summarize the issues presented in the scoping stage (Barry et al., 2016). Open houses and presentations are requirements in the scoping stage, as is the inclusion of Inuit Qaujimajatuqangit (IQ) (Barry et al., 2016). IQ is akin to Indigenous or traditional knowledge, but refers specifically to the Inuit. IQ refers to "the truth through which we live a good life in our world" (Kalluak, 2017, 41), and includes the set of ethical, cultural and traditional perspectives, in addition to the environmental understanding and contextual wisdom gained from generations of life in the Arctic (Kalluak, 2017).

Based on the guidelines issued by NIRB, a project EIS is submitted by the proponent. NIRB determines whether it addresses the requirement before a technical review can begin. The technical review is a minimum 60-day period in which a detailed assessment of project specific, cumulative, ecosystem-level impacts and proposed mitigation strategies is carried out by NIRB. Outside groups and organizations can influence this process by addressing gaps or uncertainties by writing Information Requests (IRs). When all the IRs have been considered and the technical review is completed, it is given to the proponent of the project. At this stage pre-hearing conferences (PHC) are held to offer public forums for discussion of the proposed project. These events go on the public record and in conjunction with the PHC, NIRB states the requirements that must be included in the final EIS. When the final EIS document is submitted, NIRB reviews it internally before a final hearing is held. After the final hearing the assessment report is submitted to the responsible minister for a final decision. If the minister approves the project based on the assessment report licenses are granted. The final step is for NIRB to issue a project certificate to the proponent, to which NIRB can add conditions and amendments (Barry et al., 2016).

Sinclair and Doelle (2015) describe that the extent to which Inuit organizations can influence the IA process in Nunavut comes from the nature of the NLCA, and suggest that Indigenous communities play a larger role in the NIRB process than in federal or provincial IAs. For example, there are many opportunities for public participation in the process, and the inclusion of Inuit knowledge is required. Second, Inuit Organizations like the NTI influence the composition of the nine-member NIRB. The members of NIRB are appointed by different government ministers upon recommendation or from lists prepared by designated Inuit organizations. The federal minister for Northern Affairs appoints four members upon nomination from designated Inuit organizations, two members are appointed by federal ministers, and two by ministers of territorial government. The chair of the board is nominated by NIRB members and appointed by the minister for Northern Affairs (Barry, Granchinho and Rusk 2016).

The second process option for an IA in Nunavut is through a Federal Review Panel. This option is referred to as a Part 6 review and removes much of the role of NIRB from the process. A 2008 amendment to Article 12 of NLCA removed the application of Federal IA legislation in Nunavut and limited the conditions under which the minister can elect for a Part 6 review (Barry et al., 2016). According to Barry et al. (2016), the procedure for a Part 6 review is not as well defined as a Part 5 review, in part because no project throughout the history of the NLCA has been assessment by a Part 6 review.

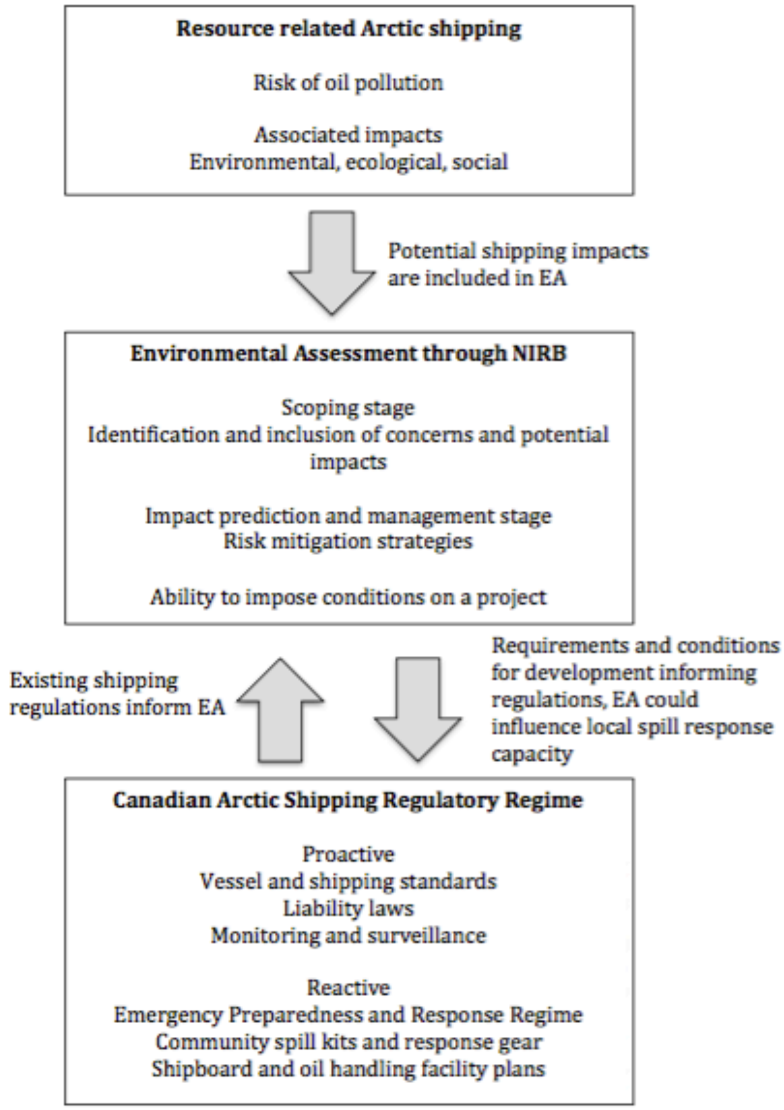
Even though Nunavut has a unique IA process, designed to give more control over projects to the Inuit and regional organizations, many authors have questioned the degree to which these organizations are ultimately able to control development and influence decision-making regarding resource development (Bernauer, 2019a; Dylan, 2017; Ritsema, Dawson, Jorgensen, & Macdougall, 2015). Dylan (2017) suggests that the ultimate discretion for development in Nunavut is still held by federal ministers in Ottawa, regardless of what the aims of the NCLA and the IPGs suggest, citing several discretionary decisions that have contradicted NIRB recommendations. In addition, Bernauer (2019b) suggests that often times the benefits proposed and promised to Inuit peoples in Nunavut are not realized though the extractive industry, and that resource extraction in the Arctic remains colonial in many ways. These authors suggest that the NIRB system, while setting up a unique IA regime with many spaces for public involvement may not end up fulfilling its aims in practice.

2.4 Chapter Summary

Given the environmental vulnerability and human dependence on the marine environment in Arctic Canada, and despite clear and evident shortcomings in our collective ability to respond to potential oil spills in the Arctic marine environment, vessel traffic in Canada's Arctic marine environment is expected to continue to increase (Dawson et al., 2018; Ocean Conservancy, 2017). In this Chapter, I have outlined why this increase in shipping comes with risks and potential negative impacts, how the existing shipping management and spill response regime attempt to control such impacts, and suggest that IA has the potential to inform decision-making around project developments and manage shipping impacts for approved projects.

To help guide my work, I attempted to capture the components described in this chapter in the framework depicted in Figure 2.1, below. In the figure, impact assessment sits between the potential impacts of Arctic shipping, and the regulatory regime, by creating a space for deliberation, decision-making, and potentially establishing parameters that could influence project shipping. IA has the potential to bridge the gap between the impacts of Arctic shipping and the regulatory regime if the challenges and impacts of Arctic shipping are sufficiently identified in the early stages of IA, leading to the potential for resource related shipping and spill preparedness to be held to higher standard than currently required by the existing regulatory regime.

Figure 2.1: A conceptual framework to guide my research



Chapter 3: Research Approach

In this Chapter I explain the research approach, design, methods, and data analysis that were introduced in Chapter 1, in greater detail. Based on the components of a research approach described by Creswell & Creswell (2018), my research was guided by a constructivist worldview, a qualitative approach, and a case study design. The primary methods of data collection used to achieve my objectives were document review and semi-structured interviews.

3.1 Constructivist Worldview

According to Creswell & Creswell (2018), broad assumptions about the world underlie every research project by informing the perspective through which the researcher begins to approach a topic or question. My research was informed by a constructivist worldview.

Creswell & Creswell (2018) describe constructivism as a philosophical approach that understands reality to be a construction of peoples' subjective understandings and perspectives. This approach asserts that individuals seek to understand the world in which they live by assigning meaning to components of the world around them. The ways in which they assign value and meaning reveal something about them and the historical and cultural context in which they live (Creswell & Creswell, 2018).

The constructivist worldview informed my research as I attempted to understand and balance the concerns, issues, and perspectives of the different participants of a given IA process. In an attempt to address IA from a holistic perspective, including the social and cultural context that underlies the reality of resource extraction in the North, a constructivist approach allowed me to embrace the complexity and variations in perspectives, rather than trying to narrow data into a small number of categories (Creswell & Creswell, 2018).

3.2 Qualitative Research Design

My research project used a qualitative research design. According to Creswell & Creswell (2018), a qualitative research design is one that focuses on the complexity of human situations and uses words and descriptions as data. Qualitative research allows research participants to demonstrate their own understanding of a phenomenon in question and allows the researcher to focus on emerging questions throughout the process (Creswell & Creswell, 2018).

A qualitative research design was an important component of an effective research design for my project since the data complied was not easily quantifiable, but based on the beliefs, concerns, and feelings of interview participants. In addition, the open-ended and flexible nature of qualitative research allowed me to acknowledge the complexity of different perspectives as the research project progressed and emerged.

The qualitative approach was also useful for my research since it allowed me to effectively combine data from different sources. As the researcher, I interpreted the data collected through the document review and interviews and synthesized data from multiple sources into useable themes and trends.

3.3 Case Study Strategy

My research employed a case study research design. According to Yin (2014), studying and understanding social situations is difficult and complicated by the fact that the phenomenon being studied often cannot be removed from its social and historical context. In such situations, case study research can be an effective strategy of inquiry since it allows a researcher to look at a particular question through a holistic approach that combines human experiences and context with the phenomenon in question (Creswell, 2007).

Creswell (2007) defines case studies as having two crucial components; (1) studying an issue or object in a case with clear spatial and temporal limits, and (2) gathering data from multiple sources in order to gain an in-depth understanding of the case. Thomas & Myers (2015) describe five layers that form the typology of a case study, including the object and subject of the case study, the purpose, approach, and process of the research.

According to Thomas (2011) and Thomas & Myers (2015), the distinction between the *object* and the *subject* of the case study is particularly important. The *object* of the case, referred to as the "theoretical frame" (Thomas, 2011, p. 512), is the lens through which the case is viewed and which the case exemplifies. The *subject* of the case on the other hand is the physical space, which is selected since it is a scenario through which the *object* of the case can be examined (Thomas & Myers, 2015).

The connection between the object and the subject, or the way the subject can reveal the object of the study, is through the case study's stated purpose, approach, and process. Thomas & Myers (2017) suggest that the easiest distinction in this sense is between theoretical or illustrative approaches. The typology suggested by Thomas & Myers (2015) helpfully separates the parts of a case study design that come together to form the frame that guides inquiry. Doing my best to apply the typology developed by Thomas (2011) and Thomas & Myers (2015) to my research project led me to the following design frame:

- The object of the study was the ways in which an IA process is able to identify and address the risk of increased shipping on a project-basis;
- The *subject* of the case was a completed IA process for a resource extraction project in Nunavut;
- The purpose of the study was *exploratory*, as it allowed the project to try to understand the effectiveness of project based IAs to address shipping increases and concerns from several different perspectives.
- The approach of the study was *illustrative*. Instead of framing the research from one perspective, or based on a theoretical stance on the IA process, this project allowed conclusions to develop that illustrated the effectiveness of the IA process.
- The process used in this project was *interpretive* in orientation, as the role of the researcher is central to qualitative research (Creswell & Creswell, 2018). The research was carried out as an in-depth single case, but made comparisons to other secondary cases.

3.3.1 Selecting cases

In order to examine the specific role that IA has played in taking shipping risks into account in Canada's Arctic, a recent resource development project was chosen as the main case study for this project. Several additional IAs were chosen as secondary cases after the selection of the main case.

The criteria used in case selection included:

- A recently assessed development project with shipping implications;
- The location of the project within the general area of the GENICE project (Hudson Bay, Hudson Strait, and Foxe Basin);
- The availability of IA documents for the case through NIRB; and
- The proximity of the project location to a local community.

At the time of case selection, the active mines in Nunavut included the Mary River iron mine, and the Hope Bay, Meadowbank, and Meliadine gold mines (WWF Canada, 2017). Of these projects, the Meadowbank and Meliadine Mine projects were situated within the GENICE study area (CBC News, 2019), both were well documented on the NIRB's online public registry, and both projects were situated in close proximity to communities, which I hoped would be advantageous when attempting to recruit local participants.

Of the two options, the Meliadine IA was significantly more recent, approved in 2015 (NIRB, 2020d), while the Meadowbank project was approved in 2006 (NIRB, 2020a), leaving the Meliadine IA as the most suitable main case for my research project. The Meadowbank project was selected as a secondary case, along with a recent expansion, the Whale Tail Project. Both these projects offered helpful context to my research and allowed for important analysis and comparison with the Meliadine IA.

Finally, the Mary River Mine IA was also included as a secondary case for comparison. It became evident early in the research that the Mary River IA had been an important forum for discussions around shipping in Nunavut, and the ongoing IA of the Mary River Phase 2 added important perspectives to my research project.

3.4 Data Collection Methods

The data collection methods used to meet the objectives of this project included document review and semi-structured interviews.

3.4.1 Document review

Bowen (2009) describes document review as the process of reviewing and evaluating documents in order to elicit meaning and gain understanding from them. In this research project, document review was used to understand the IA process for the selected cases, and to understand and analyze the way in which shipping risks were discussed and considered throughout the IA processes.

The primary source of the documents that I reviewed came from the online public registry of the NIRB. I carried out a detailed document review of the main case study by reviewing summary documents, comment submissions, report summaries, EIS documents, information requests, written submissions, public hearing reports, and final reports. The documents reviewed for the secondary cases were largely limited to summary, community, and final hearing reports. Limited additional material from beyond NIRB's registry was also consulted, including local spill response plans, policy papers, and descriptions of the regulatory regime.

Document review allowed me to understand in detail how the risks of increased shipping were considered in IA and what mitigation and response strategies were recommended throughout the process. Through extensive document review I was able to piece together and trace concerns about spill risks through the IA process, noting which actors and interested parties demonstrated concerns and made submissions about shipping, and how those concerns were addressed. I kept a detailed record of all the documents consulted for each case in an Excel sheet for ease reference and retrieval, and to maintain an effective overview of the important findings.

3.4.2 Interviews

Semi-structured interviews were carried out to complement the data from the document review and gain additional perspectives. According to Dunn (2005), an interview is a verbal exchange in which a researcher attempts to gain information, beliefs, and understandings from a participant. An interview with a semi-structured approach involves the use of an interview guide to maintain a general outline of the questions to be asked, but allows the researcher to be flexible with follow-up questions (Creswell & Creswell, 2018). Dunn (2005) describes that semi-structured interviews create space for the participants to develop and present their understanding of a research topic, and that broad and open-ended questions allow the participant to demonstrate their understanding without being lead to an answer or prompted in a direction.

Since I interviewed people from a variety of organizations, following a semi-structured interview guide allowed me to adapt some of the questions based on the findings of the document review, and the expertise or specific role of the participant being interviewed. This allowed me to ask questions specific to the participant's point of view, while maintaining the general structure of the interview. Interviewing a variety of actors was an important way to demonstrate the different perspectives of shipping risks and the IA process. Data from the interviews helped triangulate and corroborate the findings of the document review, helping to ensure the reliability of the data, and allowing me to understand the IA process from a more holistic viewpoint. A draft of the general interview guide that was used throughout this research is attached in Appendix A.

When proposing this research project I planned to carry out interviews with local people during a fieldwork season in Rankin Inlet, and carry out interview with industry and government representatives over the phone or by video call. However, the Covid19 pandemic began to impact the research activities I had proposed for this project in the spring of 2020, and in addition to substantial delays in the review of my ethics application and issuance of a Nunavut Research Institute license, I was no longer able to travel to carry out face-to-face interviews. Instead, I focused my efforts on recruiting interview participants for interviews over the phone and by video call. Interviews were carried out as per University of Manitoba ethics procedures. Interviews lasted up to one hour and were recorded to assist with data analysis if permission was granted.

3.4.2.1 Recruiting participants

Participants were recruited for my research project through purposive sampling. Braun & Clark (2013) describe purposive sampling as a method of selecting participants based on certain characteristics. As I carried out my document review, I compiled a list of names and contact information from the publically available IA documents I reviewed. This list included contact information for many representatives of participating organizations, such as the project proponent, members from local organizations, local residents and members of Inuit organizations, such as the local Hunters and Trappers Organization (HTO) and the regional Kivalliq Inuit Association (KIA), as well as federal agencies and regulators.

I was able to carry out remote interviews with representatives of the following organizations: CIRNAC, ECCC, CCG (2), NIRB, TC (2), KIA (2), World Wildlife Fund Canada (WWF), and an academic with extensive shipping related experience. I was not able to successfully recruit interview participants from project proponent, Agnico Eagle Mines (AEM), who, after initial discussions indicated they were not interested in participating, also, representatives from DFO and GN suggested in email responses that their organizations did not have much to add to this research project and declined participation.

3.4.3 Analytical tools

Several analytical tools were used to organize and interpret the data collected through the document review and interviews. These included creating transcriptions of the interviews, coding the data to identify common themes, and analyzing themes to develop findings of the research.

O'Connor & Gibson (2003) suggest that the first step in data analysis is to become familiar with the data. This involves listening to recorded interviews and transcribing them in order to get a sense of the data before proceeding with a more systematic and detailed analysis. Dunn (2005) and O'Connor & Gibson (2003) suggest that a transcript should strive to be the best possible record of an interview, by including communicative details beyond spoken words, such as descriptions of tone and gestures.

The next step in the data analysis process was to identify themes in the data and draw connection between them. Ryan & Bernard (2003) explain that themes become visible through expressions in the data, as participants' actions, works, and beliefs are representations of themes that are important to them. In order to link expressions to themes I identified codes that related back to the specific objectives of the research project, as suggested by O'Connor & Gibson (2003), and began assigning the codes to the passages of the interview transcripts.

The two main processing techniques that I used to link themes and codes were called cutting and sorting, and metacoding. Ryan and Bernard (2003) describe cutting and sorting as a technique of breaking large texts into important expressions and quotes and using those to further analyze and arrange themes into groups. By contrast, metacoding involves examining the relationship between codes found in the interview data and important themes found in the document review and literature (Ryan & Bernard, 2003).

I used Atlas.ti, a qualitative research computer software program to handle, organize, and aid in the analysis of the data that was generated through the interviews. As suggested by Braun & Clarke (2013), qualitative research programs are powerful tools since they can be used to effectively create links between the different data sources and create helpful concept maps. In my experience, Atlas.ti enabled the process of coding and analyzing data, and the coding process helped establish an organizational structure for the data (Cope, 2008).

3.4.4 Ensuring validity and reliability

In order to ensure the validity and reliability of the data and the conclusions of the data analysis, several techniques described by Creswell & Creswell (2018) were considered. As mentioned, triangulation of data through the use of different data collection techniques was an important way of validating the findings. Second, as a researcher, continually reflecting on my own worldviews and biases was important throughout the research process. Finally, data verification through member checking is a way to allow participants to check transcripts and data summaries in order to confirm and validate that the findings match the perspectives of the participants. I carried out member checking with a selection of my participants. These techniques each helped ensure that the research and analysis was carried out with sufficient rigor, resulting in quality and trustworthiness in the research findings.

Chapter 4: The Meliadine Gold Mine IA: The assessment of project-related shipping

4.1 Introduction

The following chapter establishes the extent to which shipping impacts were included and analyzed in the IA of the Meliadine Gold Project. This chapter describes how shipping was addressed in the different stages of the review, how shipping impacts were analyzed, and what mitigation and monitoring procedures were developed as outcomes of the IA. Attention is paid to the shipping related concerns brought forward by different participants, and how these concerns helped shape the level to which shipping was assessed in the IA. The documents cited throughout this chapter are publicly available through the NIRB's online public registry.[1]

An overview of the important phases of the Meliadine IA, and a timeline of the documents cited throughout this chapter, is provided in Figure 4.1 below. A detailed description of the NIRB IA process can be found in Chapter 2, Section 2.3.4.

4.1.1 Project Description: Meliadine

The Meliadine Gold Project is owned and operated by Agnico Eagle Mines Ltd. (AEM, or the Proponent), who submitted the proposal for the Meliadine Project to the NIRB in May 2011 (see Figure 4.1). The proposal outlined the construction, operation, closure, and reclamation of five open pit mines and one underground mine, and the required infrastructure for the extraction and shipment of gold. The mine site is located on Inuit owned lands, approximately 24 kilometers northwest of Rankin Inlet, in the Kivalliq region of Nunavut. The expected project timeline included a three year construction phase, an operational phase spanning about 13 years, and a 3-4 year closure and decommissioning phase (NIRB, 2014a).

[1] Meliadine: NIRB file number 11MN034. Public registry: https://www.nirb.ca/application?strP=r

[2] Valued Ecosystem Components (VECs) refer to important components in the natural or human environment. VECs are identified in the early stages of an IA, and potential impacts to VECs form the basis of impact prediction and analysis in IA (Milne & Bennett, 2016).

Figure 4.1: Timeline and overview of the Meliadine gold mine IA.

1. Screening Phase [a]		
○ Project Proposal Submitted to NIRB	4 May	2011
○ Screening begins with request for comments	10 June	
○ NIRB Screening Decision report submitted to Minister	8 July	
○ Minister refers Project to NIRB for IA	14 Sept	
2. Scoping Phase [b]		
○ Draft Scope, Proposal released for comment	18 Oct	
○ Public Scoping meetings held in communities	13 – 29 Nov	
○ Draft EIS Guidelines released for comment	9 Nov	
○ Revised Draft EIS guidelines released for comment	16 Dec	
○ Workshop to finalize EIS guidelines	31 Jan – 1 Feb	2012
3. Impact Predictions and Management Phase [c]		
Draft EIS Development		
○ DEIS submitted by proponent – issued non-conformity	25 Jan	2013
○ Revised DEIS submitted – technical review begins	22 April	
○ Proponent responds to IRs	20 Sept	
○ Proponent responds to technical comments	29 Nov	
○ Technical Meeting	3 – 5 Dec	
○ Pre-Hearing Conference (PHC) and community Roundtables	10 – 12 Dec	
○ NIRB issues PHC decision	16 Jan	2014
Final EIS Development		
○ FEIS submitted by proponent – compliance review	6 May	
○ NIRB accepts FEIS and technical review begins	21 May	
○ NIRB receives final written submissions	21 July	
○ Proponent responds to written submissions	7 August	
○ Final Hearing held in Rankin Inlet	21 -27 Aug	
4. Decision-making Phase [d]		
○ Final Hearing Report submitted to federal minister	14 Oct	
○ Minister accepts NIRB's report and allows project to proceed	27 Jan	2015
○ NIRB issues project certificate No. 006	25 Feb	
5. Post Decision Monitoring Phase [e]		
○ AEM submits Annual Report to NIRB	April	Annual
○ NIRB issues Annual Monitoring Reports	Oct/Nov	

[a] Screening: Determination if a project proposal requires an IA.

[b] Scoping: Determination of the parameters of the review; spatial and temporal scope; issues of concern; and determination of VECs.

[c] Impact prediction and management: Preparation of EIS; identification of project impacts; impact management: through avoidance, mitigation, remediation, and compensation.

[d] Decision-making: Federal decision maker review Final Report and makes a decision on the project.

[e] Post Decision Monitoring: continued monitoring of project impacts and compliance with terms of approval (Noble, 2015).

The shipping components of the project were limited to the annual resupply of fuel and supplies for the mine. As such, the expected annual shipping requirements for the project were approximately 8 vessels for dry cargo, and up to 6 fuel tankers bringing in up to 50 million litres of diesel. Resupply shipping for the mine was proposed for the open water season, following the shipping routes used for the annual sealift to Rankin Inlet and other Kivalliq communities. AEM anticipated that 14 ships would be needed annually during construction phase and the 8 to 12 ships would service the mine annually during operations (AEM, 2018a).

The Project Certificate (PC) for Meliadine (No. 006) was issued on February 26, 2015, and the commercial production phase of the project began on May 14, 2019 (NIRB, 2020d). In the 2019 shipping season a total of 12 vessels serviced the Meliadine mine during the open water season (AEM, 2020b).

4.2 Screening and scoping of shipping components

Given the considerable size of the overall project, the screening phase for the Meliadine gold mine advanced in a straightforward fashion, as participating organizations and government agencies recommended the proposal for a formal review. The shipping components of the project were included in the list of project activities in the proposal and screening documents, but beyond that, shipping was not addressed by any organizations in the screening stage of the review (NIRB, 2011c).

The minister's decision, in accordance with the recommendation included in NIRB's Screening Report, recommended the Project for a Part 5 review. The report accompanying the minister's recommendation did not specifically address shipping, but emphasized three areas of concern identified in the NIRB's Screening Report, including concerns regarding the potential cumulative effects of increasing mineral development in the Kivalliq region (NIRB, 2014b).

During the scoping phase of the IA, discussions regarding the inclusion of shipping were often characterized by disagreements between parties. ECCC continually argued for the inclusion of the shipping route in the scope of the project due to potential effects of shipping activities on marine and migratory birds

(Environment Canada, 2011b, 2011a), and concerns over potential fuel spills and cumulative marine traffic in the region (NIRB, 2012d). Other parties demonstrated concerns with shipping related activities, such as fuel delivery and transfer operations (KIA, 2011), procedures for avoiding and monitoring disturbance of marine mammals, and the overwhelming need for baseline studies along the shipping route (Government of Nunavut, 2011).

The Proponent on the other hand, argued against the inclusion of shipping impacts into the assessment scope. Multiple submissions from AEM suggested that all shipping activities would be covered by regional shipping regulations and should be considered beyond the scope of the project assessment. AEM argued against the inclusion of the shipping route, any marine VECs[2], and all analysis of potential impacts along the route. AEM argued that project-related shipping would not add significantly to regional shipping and that it therefore would be "too onerous a requirement to ask AEM to conduct full [IA] of marine environment along existing shipping routes that have been used for many years to supply Rankin Inlet…" (AEM, 2011, p. 2). In response, NIRB submitted that the shipping activities related to project resupply were a basic component of any project and therefore it was expected that shipping impacts would be addressed in an EIS for the project (NIRB, 2011a).

The final scoping documents and the EIS guidelines for the Meliadine Project were issued by NIRB on February 20, 2012. Significantly, the entire proposed shipping route to be used for Project resupply within the bounds of the Nunavut Settlement Area (NSA) was included in the spatial scope of the Project. The proposed shipping lane was designated as part of the local study area, while a 10km wide swath centered on the shipping lane was included as the regional study area (RSA) and defined the area in which shipping impacts to VECs in the marine environment were to be considered. The VECs identified for the project with links to shipping activities included noise and vibration, migratory and sea birds, marine wildlife, and the marine environment (NIRB, 2012c).

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[2] Valued Ecosystem Components (VECs) refer to important components in the natural or human environment. VECs are identified in the early stages of an IA, and potential impacts to VECs form the basis of impact prediction and analysis in IA (Milne & Bennett, 2016).

The first Draft EIS (DEIS) submitted by the Proponent on January 25, 2013, was issued with a nonconformity determination by NIRB (NIRB, 2013b). It is worth noting that significant deficiencies in the DEIS included the omission of shipping related components and the entire section of the EIS guidelines pertaining to marine birds and bird habitat (NIRB, 2013c). Given the continued disagreement around the inclusion of shipping (AEM, 2011, 2012; NIRB, 2012a), omitting the marine sections in the first DEIS may have been one last attempt to keep shipping activities outside the scope of the assessment.

The second DEIS, received on April 22, 2013, addressed the deficiencies of the first submission, resulting in a positive conformity decision and the beginning of the technical review period (NIRB, 2013a).

4.3 Shipping impact analysis and prediction: FEIS

The inclusion of shipping was an ongoing development in the IA for the Meliadine mine. The following section outlines how shipping impacts were identified and analyzed within the Final Environmental Impact Statement (FEIS).[3]
Many of the comments and concerns of interested parties described throughout this chapter helped establish the shipping requirements of the FEIS, and also pushed for a greater shipping related analysis after the FEIS was submitted.

The FEIS presented the potential effects of project shipping activities on the VECs selected in the scoping phase. Volume 8 of the FEIS presented the marine baseline and addressed the likelihood and significance of the potential effects of the project on the marine environment and marine wildlife. With the addition of the mitigation measures and monitoring procedures that had been developed up to this point in the IA, the FEIS concluded that the potential impacts associated with marine shipping for the Project were predicted to be insignificant (AEM & Golder Associates

[3] An Environmental Impact Statement (EIS) is a tool use to ensure that the requirements of the IA, established in the scoping phase through the design of EIS guidelines, are met. Several iterations of an EIS are submitted by the proponent, which are reviewed by the parties in the IA, leading to the submission of the Final EIS (Milne & Bennett, 2016).

Ltd., 2014b). The following sections establish how each VEC with marine and shipping implications was addressed in the FIES.

4.3.1 Marine Water Quality

When addressing potential project effects on marine water quality, the only primary effects pathway identified in Volume 8 of the FEIS was through accidental fuel spills into the marine environment.

The FEIS addressed small and worst-case fuel spills, categorizing them in terms of magnitude, extent, duration, frequency, likelihood, and reversibility. While a potential worst-case spill was described as more significant than a small spill using these categories, the FEIS suggested that the location of the spill, and the ambient and oceanographic conditions at the time of the event would play an important role in the eventual impacts of a large spill. The probability of both small and worst case spills were understood as unlikely, and the long-terms effects were considered reversible over time. With the proposed mitigation measures in place (see Section 4.6.2), the occurrence of a worst-case spill was described as "not likely to occur during the lifetime of the Project… [and,] the effect of worst case diesel fuel spills on marine water quality is thus expected to be not significant" (AEM & Golder Associates Ltd., 2014b, p. 22).

In addition to fuel spills, other contaminant discharges from ships such as sewage, chemicals, antifouling agents, bilge water, and ballast water were also mentioned in the FEIS. In relation to these impacts, the FEIS cited compliance with the existing regulatory apparatus for shipping in the Arctic as sufficient mitigation of these potential impacts. In the instances that these contaminants were alluded to in the IA as a whole, TC ensured the need for compliance with all Arctic shipping regulations (NIRB, 2014a).

4.3.2 Marine Mammals and Seabirds

In the FEIS, fifteen effects pathways were identified for potential impacts on marine mammals and seabirds from Project activities. Of the fifteen effects pathways, six were identified as primary pathways and carried though the effects analysis. These effects pathways included the disturbance to fish habitat quality due to grounding of barges; sensory disturbance from lighting, noise, and human activities resulting in bird collisions or behavioral changes; underwater noise from vessels altering marine mammal and fish behaviour; vessel collisions with marine wildlife; and the indirect effects on wildlife associated with accidental spills from fuel transfer operations and vessels. The additional no-linkage pathways and minor linkage pathways identified were addressed through design features and mitigation measures (AEM & Golder Associates Ltd., 2014b). The FEIS concluded that with the proposed mitigation measures in place, the scale of potential impacts to marine mammals, fish and birds should not be large enough to cause irreversible changes to the population levels or decrease the resilience of the marine VECs. Even in the case of a worst-case fuel spill, long term population effects on marine wildlife were understood to be insignificant (AEM & Golder Associates Ltd., 2014b).

Additional VECs such as harvesting, land use, and food security were included in the analysis of impacts to marine wildlife. The FEIS suggested the project should not have significant adverse effects on the continued traditional and non-traditional use of marine resources in the region (NIRB, 2014a).

4.3.3 Follow-up and monitoring

The FEIS suggested that monitoring and follow-up activities for many of the marine related VECs were not recommended due to the insignificance of potential impacts and the challenges of carrying out effective monitoring. For example, no environmental monitoring was required for marine water quality, since Project design choices to avoid sensitive areas and the proposed mitigation measures described in the FEIS and Shipping Management Plan (SMP)[4] would sufficiently mitigate the potential effects of a spill (NIRB, 2014a). Monitoring effects on fish and fish habitat was also not suggested since the effects were understood as insignificant and monitoring the behavioral responses of fish to underwater noise from vessel would be difficult to achieve (NIRB, 2014a). Further, the implementation of the mitigation procedures outlined in the SMP, along with marine mammal monitoring undertaken

[4] Different iterations of the SMP were submitted throughout the IA, each new version reflecting additional concerns mentioned through the process.

by shipping contractors, was understood to sufficiently avoid potential interactions and impacts on marine mammals (NIRB, 2014a).

4.3.4 Additional non-marine VECs

Additional VECs affected by broader project impacts, such as noise, vibration, and air quality, were overwhelmingly assessed without the inclusion of marine activities. The effects of noise, vibration and air quality of the Meliadine Project as a whole were focused on the blasting activities at the mine site and the potential impacts of these on the town of Rankin Inlet. The specific study areas for noise and vibration were focused on the effects to people (NIRB, 2014a), so while the map of the noise assessment local study area presented in the FEIS includes the Rankin Inlet harbour area (AEM & Golder Associates Ltd., 2014a, Figure 5.1-2), according to the FEIS, shipping noise would fall into the regional study area (RSA), which was not defined for the noise assessment. Similarly the potential effects on air quality from marine shipping were considered beyond the RSA for air quality (AEM & Golder Associates Ltd., 2014a).

Concerns about this approach were submitted by the Aqiggiq HTO and KIA, suggesting that noise from shipping should be considered and monitored since it would contribute to the overall noise budget. In response to these comments, AEM suggested that these potential impacts were considered in the FEIS, which concluded that Project shipping would not result in any significant noise and vibration impacts (NIRB, 2014a). In the FEIS however, noise from shipping was understood as a minor effects pathway due to the distance from the sound receptors established in the site study area (AEM & Golder Associates Ltd., 2014a). In this way, the sound and vibration emissions from shipping were excluded from the overall noise and vibration monitoring for the project through the spatial establishment of the study areas.

An exception to this exclusion of shipping emissions was found when assessing Project-related greenhouse gas emissions. In this regard, shipping was described as a primary effects pathway in the FEIS. This may be in part due to a specific request from ECCC in the technical review stage calling on load factors and sulfur content be include in the calculations of air emissions from shipping (AEM, 2013c). These values were included in the FEIS, but the carbon emissions from shipping were understood as negligible in magnitude, resulting in the determination that effects on air quality were not significant, including cumulative air emissions since these "will occur over a widely dispersed area" (AEM & Golder Associates Ltd., 2014a, p. 56).

As a whole, the FEIS presented the shipping operations associated with the proposed project as a routine operation, focused the impact analysis on a small list of potential impacts to VECs, and predicted that any likely impacts to the marine environment would be insignificant.

4.4 Shipping related concerns brought forward in the IA

The following section presents the important concerns of participating agencies expressed throughout the IA. The concerns of governmental agencies, in the form of information requests (IR) and technical comments[5] most often garnered direct responses from AEM in the development of the EISs and management plans. The concerns of local individuals however, were most often documented by NIRB in Hearing and Community Roundtable reports, and often were not addressed directly by AEM.

4.4.1 Local/Inuit Concerns

The shipping related concerns of local residents were well documented throughout the IA for the Meliadine Mine. Starting in the scoping phase and at every subsequent opportunity for public input, local people and community representatives documented the observed impacts of existing shipping, and demonstrated concerns over potential future impacts.

The local Inuit participants continually stressed the importance of the marine environment, the fragility of Arctic ecosystems, and the general uncertainty that accompanies Arctic shipping. Local communities emphasized the lack of understanding of the marine environment in general and were particularly concerned

[5] Parties involved in the IA have the opportunity to review the EIS submitted by the proponent. Information Requests (IRs) are submitted to identify information gaps within the EIS, while technical comments address details in the information presented by the Proponent (Barry et al., 2016).

about the shortcomings in the understanding of potential impacts from shipping on marine mammals (NIRB, 2014a).

Local participants demonstrated ongoing concerns and mentioned many changes that have been observed in the marine environment due at least in part to the increase in shipping activities in the region in recent years. The observed changes included changing sea mammal population patterns, changes in the quality and taste of some marine species (NIRB, 2013d), and declining seal populations in the area (NIRB, 2013d, 2014a). These observations were presented with concerns about the potential impacts of cumulative shipping associated with the Meliadine project in addition to existing and potential future shipping volumes, on the already decreasing populations of marine wildlife and birds in the region (NIRB, 2011b, 2014b).

In addition to concerns about the volume of shipping, the proximity of the proposed shipping route to important marine habitat and hunting areas, and the potential impacts to traditional food sources in the region as a whole, was a primary concern for the community members from the Kivalliq region (NIRB, 2011b, 2013d, 2014a). Community members suggested that the shipping route's proposed 2 km setback distance from Marble Island would not sufficiently protect migrating whales from shipping impacts (NIRB, 2014a). Similarly, representatives from Coral Harbour continually requested that ships avoid Coates Island and refrain from traveling between Southampton and Coats Island, instead preferring the route south of Coats Island (NIRB, 2014b). Another related concern mentioned frequently throughout the public meetings, was the issue of compensation for environmental damages in the marine environment and to marine mammals (NIRB, 2013d, 2014a).

Significant concerns were also documented in regard to fuel spills and their potential impacts on marine mammals and the marine environment. Concerns emphasized the lack of local spill response capacity and the uncertainties about the long-term effects of spilled fuel on marine wildlife. Given the potential devastating consequences of a large fuel spill for communities, their concerns included the lack of long-term impacts in AEM's assessment and the shortcomings of spill modeling carried out in the IA (NIRB, 2014a). Concerns over the spill preparedness in the North were also voiced, along with concerns about the significant impacts of wildlife coming into contact with spilled fuel (NIRB, 2011b, 2014a).

CIRNAC (then AANDC) gave voice to some of these concerns in their submissions to AEM. For example, they requested that AEM include information on how the potential impacts on marine mammals would affect the socioeconomic conditions of local residents who rely on marine mammals for food (AEM, 2013f), and called for the inclusion of IQ and local concerns in the discussion on socioeconomic impacts arising from shipping on marine species of cultural significance to local people (AEM, 2013a).

Throughout the review, Inuit organizations and local participants contested the merit of AEM's conclusion that the project was not expected to affect the sustainability of marine resources for harvesting (AEM, 2013f; NIRB, 2014a), and demonstrated concerns about the inclusion of IQ in the FEIS as a whole. In their final submission, NTI and KIA addressed the shortcomings of FEIS Volume 8 in this regard, especially the section on marine wildlife, noting that the overall integration of IQ in the section on marine mammals was meager (NIRB, 2014a).

Another area of concern for Inuit organizations and local participants was the effectiveness, transparency, and dissemination of information from monitoring programs and emergency response plans. Community members wondered how AEM would monitor the effects of shipping on many different species of marine mammals, how the effects of noise from shipping could be monitored, and how the effects would be reported back to community elders. Communities wanted assurance that monitoring the impacts on Coates, Walrus, and Marble Islands would take place, and that IQ of local communities would be taking into account (NIRB, 2013d, 2014a).

NIRB addressed the high level of concern demonstrated by local people regarding the marine environment at numerous times throughout the review. For example, at the Pre-Hearing Conference (PHC) NIRB required the Proponent to, "address in the FEIS the Kivalliq communities' concerns with increased marine traffic associated with the Project, specifically related to marine safety, the need for adequate spill response equipment and training both onboard vessels and in communities, and noise and disturbance of marine mammals," and to reconsider cumulative effects related to marine shipping (NIRB, 2014b, p. 28-29).

The concerns of the local Inuit communities were a constant theme throughout the rest of the review. The sheer volume of community concerns related to the marine environment in the reports cited above, in comparison with other areas of concern, indicates that marine impacts due to shipping were a particular concern of the communities in the region.

Many of the concerns brought forward by community members in the IA of the Meliadine project have also been established in the literature. Numerous papers have shown that environmental concerns in the Arctic region are heightened as a result of the fragility of the ecosystems found there (Gulas et al., 2017; Laidre et al., 2015), which may be further compounded by the ongoing environmental stressors due to climate change (WWF Canada, 2014). The potential consequences of marine oil spills could leave Arctic communities vulnerable to profound disruptions to their way of life, marine resources, and food security (DeCola et al., 2017; Pizzolato et al., 2014). Numerous authors suggest that significant gaps and shortcoming exist throughout Canada's Arctic oil spill response plans (Dawson et al., 2018; DeCola et al., 2017; Gulas et al., 2017; WWF Canada, 2017), compounding these concerns further. The lack of scientific understanding underpins these concerns, such as the incomplete knowledge of baseline data (Gulas et al., 2017), an inadequate ability to model the fate of oil spill in the Arctic marine environment (C-CORE, 2013), and the fact that the true understanding of pollutants and their impacts is incomplete, leaving us unable to truly understand the effects a large-scale spill would have in the Arctic (Wilkinson et al., 2017). As will be demonstrated in the sections that follow, the ongoing concerns of communities had tangible outcomes for the IA by pushing the Proponent to improve many aspects of the marine impact analysis and shipping related mitigation measures.

4.4.2 Shipping related concerns of participating agencies and organizations

The governmental agencies taking part in the IA process each participated on the basis of their legislative mandate and area of expertise. Therefore, the types of shipping-related concerns these agencies voiced vary substantially.

For example, based on its mandate, TC's role in IA is primarily tasked with ensuring compliance with the shipping regulatory regime. As such, the involvement of TC was limited to this role and did not push for shipping related measures that went beyond the existing regulations. The Government of Nunavut's approach to shipping concerns was expressed through its jurisdiction over terrestrial wildlife, resulting in concerns related to polar bears. DFO's mandate includes jurisdiction over fisheries and marine mammals, but as discovered in the document review, DFO demonstrated little concern over marine shipping in this case. Aside from one comment regard vessel noise (AEM, 2013g), DFO focused their concerns regarding this project on the freshwater environment (AEM, 2013a). Given the mandates of these agencies, local communities and the KIA took the lead on concerns regarding marine mammals.

In comparison with the agencies described above, the concerns and comments documented by ECCC were more flexible in how they approached potential shipping impacts. Based on ECCC's mandate to protect migratory and sea birds and important marine habitat areas, their comments and suggestions regarding marine shipping were broader in nature. This means that the focus of ECCC's concern was not solely on one aspect of shipping, but a broader approach to the marine environment as a whole, resulting in concerns regarding routing measures, air and noise emissions, baseline studies, and mentions of chronic ship-based pollution and cumulative effects. Similarly, the KIA's broad mandate to protect the interests of the Inuit beneficiaries of the NLCA, allowed them to address a wide range of shipping related concerns, including biological and social components, and assume an important role in the establishment of marine mitigation and monitoring plans for the project.

4.5 Impact Analysis and Prediction

An important function of the IA process is to develop impact predictions for the components of the proposed project. The following section outlines the marine baseline established for the assessment and the spill dispersion modeling carried out to understand the potential impacts of a large ship-based fuel spill.

Many concerns were documented in the IA regarding the quality of AEM's impact analysis. Some of the shortcomings in the marine baseline presented in the EIS and limitations in AEM's conclusions regarding fuel spill modeling are presented here.

4.5.1 The Marine Baseline

The extent to which marine baseline conditions were established for the analysis of shipping impacts in the Meliadine IA became an important area of criticism of the way the marine environment and shipping impacts were addressed in the IA as a whole. The inadequacies identified with the established baseline submitted by AEM were multiple, including the general quantitative nature of the baseline, insufficient site-specific data, and the lack thresholds to understand or identify changes. Taken together, these areas of criticism cast doubt over the usefulness of the baseline data to help identify and monitor potential environmental changes due to project activities related to shipping.

Early concerns over the marine baseline suggested that species of importance had been excluded, resulting in incomplete assessment exercises such as shipping risk and spill dispersion modeling. For instance, GN argued that polar bear populations along the shipping route had to be included for the true impact of a fuel spill to be accounted for (Government of Nunavut, 2013), while KIA requested that walrus haulouts be included in the marine baseline (KIA, 2014). In response to these concerns, and others related to marine mammal and sea bird distribution and density along the shipping route from ECCC, AEM committed to reviewing the occurrence of these species, and gathering more information in order to better assess the potential impacts of a spill along the shipping route (NIRB, 2014b).

These improvements informed the marine baseline submitted in the FEIS, but new concerns emerged following its submission. Notably, KIA submitted detailed criticisms of the marine baseline established in the IA and the resulting consideration of marine impacts. First, KIA was concerned over the limited information regarding marine mammal baselines in Hudson Strait and Hudson Bay, suggesting that the lack of baseline information downplayed the likelihood of interactions between vessels and marine mammals. Further, KIA suggested that an overall insufficient level of detail had been presented, citing the fact that no actual data collection had taken place along the shipping route. In response to the baseline sampling that was carried out in 2011, KIA suggested that it was insufficient since it was limited to Melvin Bay, and did not account for any seasonal or multi-year variation in conditions. Overall, KIA was critical of the qualitative nature of the baseline as a whole, also noting that no quantitative data was presented that would help determine the magnitude of changes in the future. KIA suggested that a more comprehensive baseline was needed to allow for more meaningful impact predictions, effective monitoring, timely mitigation, and meaningful adaptive management (KIA, 2014).

KIA's submission concluded with a series of potential project conditions to remedy the shortcomings. In response, AEM agreed to look into these recommendations, but noted that these concerns were not raised in the technical review of the DEIS, and suggested that the baseline was sufficient in their view and that areas for additional baseline work would be limited to Melvin Bay (NIRB, 2014a).

Given the concerns with the marine baseline, two PC terms and conditions were included to address some of these shortcomings. Condition 79 called on the Proponent to update its marine baseline information to include the most recent information on wildlife abundance and distribution, to consider seasonal wildlife distribution patterns, and incorporate scientific and IQ knowledge sources, while Condition 80 called on the Proponent to assess all available baseline information for Melvin Bay and the area surrounding fuel transfer activities in order to ensure adequate detection of Project-related impacts from contaminants (NIRB, 2014a). Compliance with these terms was noted after the submission of a revised baseline as part of the 2016 SMP (NIRB, 2016b), but no additional site-specific physical data was collected anywhere beyond the bounds of Melvin Bay (AEM & Golder Associates Ltd., 2016).

4.5.2 Spill Dispersion Modeling and Shoreline Characterization

As part of the assessment of potential shipping impacts, AEM carried out a shipping risk assessment and fuel spill dispersion model to help determine the risks associated with the shipping operation (AEM, 2014a). This model was continually improved throughout the stages of the IA.

The original fuel dispersion model, submitted in the DEIS, was based on a previous study in which the fate of a crude oil spill in Baffin Bay had been modeled. This exercise made simple conclusions about the potential behaviour of spilled fuel and the distance it could travel, but included no project specific scenarios or information (AEM & Golder Associates Ltd., 2013).

In response to concerns regarding this model, an improved spill risk assessment and fuel dispersion model was included in Volume 8 of the FEIS. In this model, the behaviour of a potential fuel spill in the marine environment was assessed at two locations near Melvin Bay and four locations along the shipping route. This model was used to estimate the time needed for a fuel slick to reach shore in each location, using the average wind velocity, 50-year high wind velocities, and diesel weathering data. Additional site specific variables such as wave action, ocean currents, and tidal effects were not included in the model (AEM & Golder Associates Ltd., 2014b).

Concerns about the adequacy of the model persisted. KIA suggested that the spill dispersion model was inadequate since ocean currents were not included in the model and little site-specific data, like wind conditions, meant that this exercise could not provide much guidance for spill response since the model was not realistic (NIRB, 2014a). In addition, ECCC recommended that several potential scenarios be used in order to represent a worst-case spill incident and help identify potential high-risk areas (NIRB, 2014a), and GN recommended that a quantitative threshold and criteria for the definition for a major spill be established (AEM, 2014b).

AEM responded to these concerns, suggesting that they were open to working on the emergency and spill response plans should the project be approved, but maintained that it was their view that the level of information provided in the FEIS was sufficient since it demonstrated that emergencies had been considered, and that plans to mitigate impacts had been developed (AEM, 2014b). The sufficiency of the model was also justified since the fuel to be transported was diesel, and diesel's low viscosity and rapid weathering properties lessen the impact magnitude of a spill when compared with heavier fuels (NIRB, 2014a).

NTI and KIA continued to press for additional spill dispersion information in their final written submission, such as questioning the assumptions of the model and the rationale behind the use of data inputs and site-specific data that was used. NTI and KIA requested that the Proponent reassess the spill predictions and modeling to consider additional scenarios, wider ranges of environmental conditions, and seasonal variation in marine mammal concentrations and seabird presence to increase the certainty around predictions and lead to better spill response planning (NIRB, 2014a). These suggestions were included in the Project Certificate as Condition #78, which required the proponent to conduct significantly improved fuel spill modeling work (NIRB, 2014a). Notably, this condition called only for the modeling of diesel fuel for the mine and did not call for the modeling of any additional fuel types such as intermediate or heavy fuel oils that may be carried on vessels. Concerns over these additional fuel types were not brought forward by any participating organizations in the assessment for Meliadine.

In accordance with Condition 78, the submission of the 2016 SMP (Version 5) included a revised spill dispersion model. This revised assessment included more spill locations, new spill volume scenarios, and more oceanographic and meteorological conditions. The fate of spilled diesel was modeled at five locations in and near Melvin Bay, and at nine locations along the shipping route, corresponding with proximity to important ecological areas, and areas with navigational challenges, such as near Marble Island and Coats Island. The spill scenarios used included a 2 million litre spill, a 20 million litre worst-case scenario, and a 100 000 litre spill in Melvin Bay. In comparison with the earlier dispersion models, additional parameters were used, including wind data from Coral Harbour and Rankin Inlet, as well as seasonal and extreme wind speeds (AEM, 2018b).

This model showed that for all spill scenarios near Melvin Bay between 89 - 100% of the total volume of spill diesel would ultimately reach the shore, starting somewhere between 6 and 80 minutes after a spill if no mitigation occurred. For the spill scenarios along the shipping route it was determined that the time needed for the spill to reach the shore varied from 4 hours to 50 days for the 2 million litre scenarios, with between 0 – 66% of the volume reaching shore. The dominant slick trajectory was determined to be to the south-southeast for all scenarios, except in the 50-year wind scenarios in the eastern locations, changing the trajectory to the southwest (AEM, 2018b).

While this modeling exercise represented significantly more detail and site-specific data than previous models, the scenarios depicted in the model were still desktop models under specific conditions, meaning that the trajectory of a spill event in the real world would be dependent on a series of ambient conditions, wave action, and the nature, time, and location of the spill. This modeling exercise was described as a one-dimensional analysis, and for this reason a high degree of uncertainty remained in any conclusions identified through the exercise (AEM, 2018b).

The KIA stated that in pushing for this improved spill model it hoped that new or better findings would be useful in informing spill response planning along the shipping route (NIRB, 2014a). There is no evidence that the dispersion modeling carried out for the Project had any impact on response planning. As is described in Section 4.6.2, even though the entire shipping route was included in the spatial scope of the assessment, no project specific spill response capacity was established along the shipping route.

4.6 Mitigation of shipping impacts

In order to address the potential impacts of project shipping, several different mitigation measures were designed in the IA process. The main methods of mitigating potential impacts of shipping activities associated with the Meliadine project included operational measures such as routing and vessel speed restrictions to reduce the likelihood of shipping impacts to wildlife, and the use of industry best practice strategies and emergency response plans to address the consequences of potential fuel spills.

4.6.1 Mitigation of risks to marine wildlife

A series of project-specific mitigation measures were established in an effort to reduce the potential impacts of shipping activities on the marine environment. The preventative mitigation measures for shipping activities were described in the SMP, and focused on preventative and precautionary mitigation measures such as setback distances and vessel speed limitations.

The specific setback distances described in the SMP indicate that vessels must remain at least 2 km from Marble Island, 500m from any marine mammals seen in transit, and 300m from a walrus or polar bear seen on sea ice. The SMP states that ships will give marine mammals the right of way if they are spotted, avoid accelerating within 500m of marine mammals, maintain a straight course with constant speed, and make sure not to separate individual mammals from larger groups. Reduced speed limits for barge and tug boats near shore (2 knots or less) were included to help reduce the potential for disturbance of marine wildlife and reduce wake impacts on low-lying shoreline areas (AEM, 2018a).

Throughout the IA, ECCC played a significant role in the establishment of these mitigation mechanisms by demonstrating concerns with increased shipping in the region and the potential impacts of chronic ship-based pollution, cumulative disturbance, and potential effects on birds. ECCC pushed for the inclusion of key marine habitat sites for migratory birds in the protected and sensitive areas along the shipping route (AEM, 2013d), suggested specific setback distances to ensure ships would avoid important habitat areas, and requested a commitment from AEM to avoid Coats Island by 30 km (AEM, 2013a).

Other concerns from ECCC included the assessment of marine species at risk, and the potential impacts on migratory bird nests in low-lying shoreline areas due to wake from project-related vessels (AEM, 2014b). AEM continually contended that these measures were unnecessary, since "the long term viability of marine bird populations is not expected to be affected; therefore, effects are predicted to be not significant" (5) (AEM, 2013d), but ultimately committed to including the setback distances recommended by ECCC in its shipping contracts (NIRB, 2014b), and in the

SMP (AEM, 2014c).

4.6.2 Spill risk mitigation

In addition to the setback distances and speed restrictions described above, the establishment of emergency response capacity to respond to potential fuel spills was another important aspect of mitigating potential risks and impacts of project shipping. Even though the entirety of the shipping route within the NSA was included in the scope of the assessment and fuel dispersion modeling was carried out along the entire route, the spill response capacity established by AEM remained focused on the Itivia Oil Handling Facility (OHF) at Rankin Inlet. Therefore, the project specific measures imposed on the project did not exceed the basic requirements of the Arctic shipping regulatory regime in any substantial ways.

As suggested above, the FEIS concluded that with the proposed mitigation in place, a worst-case scenario was unlikely to occur during the life of the project (NIRB, 2014a). Several participants in the IA were critical of this conclusion, such as GN, who argued that the reliance on the low likelihood of a spill functioned to downplay of the severity of the potential impacts of a spill (Government of Nunavut, 2013), and community members from Coral Harbour, who asked for emergency response teams to be located in their communities before a spill event were to happen (NIRB, 2014b).

The regulatory requirements for spill response capacity were mentioned in several IRs and technical comments from TC in an effort to ensure AEM would comply with the shipping regulatory regime (AEM, 2013e). These requirements included the development of an Oil Pollution Emergency Plan (OPEP) for the OHF, and contracting only certified shippers with valid SOPEPs.[6] In the dialogue that followed these IRs, AEM demonstrated the limits of their role in the spill response regime with clarity. The following excerpts demonstrate that AEM has no legal requirement to establish any spill response capacity beyond the immediate vicinity of their OHF. For example, AEM referenced that the polluter pay principle “obliges AEM to cleanup any spills that might occur at the Itivia [OHF],” and that any fuel spill events along the passage are

[6] A Shipboard Oil Pollution Emergency Plan (SOPEP) is a regulatory requirement for all large vessels and fuel tankers in Canadian waters (DeCola et al., 2017).

the responsibility of the ship as per the procedures of their SOPEP (AEM, 2013b, IR No.: 149 p. 2).

Nevertheless, in the event of a spill from a tanker, AEM suggested that assistance would be offered wherever possible, but that this assistance would be limited to the near-shore at the Itivia OHF. When addressing coordination with CCG resources, AEM suggested that, "if the CCG's resources and equipment are not available, that held by the ship(s) and AEM would have to suffice," (AEM, 2013b, IR No.: 150 p. 3).

At the OHF, a series of interconnected emergency management plans established AEM's emergency response framework. These include the Emergency Response Plan (ERP), SMP, and most importantly for marine fuel spills, the OPEP (AEM, 2020d). The spill response capacity as required in the OHF regulations for a Level 2 Facility such as the Itivia OHF, based on its maximum diesel transfer rate of $400m^3$/hr, is to maintain equipment and resources to respond to a $5m^3$ spill within specific timelines (AEM, 2020d).

AEM's 2020 OPEP described several spill response scenarios that demonstrate the response capacity held by AEM. For spills greater than $1m^3$ the ERP would be activated, meaning that the mine site emergency response team would assist in the cleanup at the OHF. In a spill scenario larger than $5m^3$, response materials from the sea cans along the road to the mine site would be brought to the OHF to help contain the spill and assist in the recovery of fuel. The OPEP references a boat and additional watercraft that may be made available and lists several precautionary measures in order to mitigate the spill risk during ship to shore transfer, such as alerting CCG and TC prior to any fuel transfer activities, and having trained personnel in communication with one another at both ends of the transfer activities (AEM, 2020d).

The total capacity available at the OHF to respond to marine spills as an aggregate of the spill response gear described in the OPEP yields a storage capacity of 5973 litres. Additional capacity would likely be available through sorbent pads, Quatrex bags, and the use of additional resources listed in the OPEP such as water trucks and a vacuum truck, whose dimensions are not defined in the OPEP (AEM, 2020d). The OPEP suggest that with the additional response equipment a tanker would have on board, a spill in the size of 5000-10000 L could be controlled and cleaned up, but anything beyond 10 000 L would require external assistance (AEM, 2020d).

KIA was the only party in the IA to call into question the adequacy of the level of spill response capacity described above. KIA noted that a 100,000-litre spill scenario had been used in the spill modeling to represent a worst-case scenario during ship to shore transfer, and that in the case of a hose rupture, it would take 15 minutes to surpass that amount of fuel at the maximum transfer rate. KIA was skeptical that 5000 litres of response capacity was sufficient, pointing out that if pumping were ceased, an additional volume of up to 2356L of diesel could be held in the floating hose (KIA, 2014). Due to the timing of KIA's submission, AEM did not respond explicitly to these concerns (AEM, 2014c).

Several PC terms and conditions suggested a potential broadening of the regulatory requirements for spill response. Notably, Condition 77 stated that "the Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the project in a self-sufficient manner" (NIRB, 2014a, p. 268). While this condition is worded broadly, NIRB Monitoring Reports suggest that AEM is in compliance with this term given the spill response capacity described in the OPEP (NIRB, 2017b).

Additional conditions regarding accidents and malfunctions were also included in the PC (Conditions 120-123). In general, these conditions reiterated the regulatory requirements of Arctic shipping, and called for all potential spills to reported, the monitoring of all project ships in and out of Rankin Inlet, and called for all best practices during fuel transfer to be followed (NIRB, 2014a).

At numerous times in the IA, TC emphasized the importance of coordinating AEM's spill response plan with the CCG's National and Regional Spill Contingency plans, and local spill response capacity (AEM, 2013b). TC also emphasized the need to consult with the Hamlet regarding the coordination of response efforts and training for potential spill events at Rankin Inlet and the Itivia OHF (NIRB, 2014b). Annual spill response training has taken place in Rankin Inlet and mock spill scenarios were carried out in 2018 (AEM, 2019a). During the 2019 Shipping Consultation tour in

Chesterfield Inlet and Coral Harbour a request was documented to extend spill response-training exercises to other Hamlets along the shipping route. The report suggests that this a is a possibility in need of further consideration (AEM, 2020a).

In terms of spill response capacity as a strategy to mitigate the potential impacts of fuels spills, the development of the Meliadine mine did not include any project specific spill response capacity measures that went above the regulatory requirements for the Itivia OHF.

4.7 Monitoring Shipping Activities

After designing and implementing mitigation measures, as described in the preceding section, the focus of the following section shifts to monitoring adherence to these mitigation measures and monitoring shipping activities in general.

The ability to effectively monitor adherence to the mitigation measures described above was an important concern for the participating agencies in the IA. ECCC was the first agency to recommend the inclusion of shipping logs and vessel tracks as a basic tool to monitor adherence to the setback distances described in the SMP (AEM, 2013a), and AEM committed at the PHC, to do its best to submit ship track data to NIRB as part of its annual reporting (NIRB, 2014b).

Attempts were made to force AEM to provide more detailed ship track data, such as KIA requesting at the Final Hearing that time stamped vessel locations be included to monitor the adherence to many of the mitigation measures imposed on shipping contractors in the SMP. KIA referenced the fact that ships supply this type of information as part of the NORDREG requirements, and contented that NIRB had the mandate and ability to include such a requirement on a project basis (NIRB, 2014a). In response, AEM argued that requiring this information would not be "reasonable," and that ECCC and TC should work together to gathering this information from all ships (AEM, 2013a).

Ship track data was first submitted to the NIRB along with AEM's 2019 Annual Report. According to the report, the tracking data submitted was taken from the shipping contractor, Transport Desgagnés' fleet location site, and limited ship position data points were available and therefore the tracks presented were not complete, with ships even appearing to trek across land at times, due to the straight line combination of limited location points (AEM, 2020e).

At the very best, the quality, completeness, and limited detail found in the ship tracks provided by AEM in 2019 pose questions as to the effectiveness of ship track data to adequately monitoring adherence to the mitigation measures established for Project shipping. The ship tracks submitted did not include enough data points to meaningfully depict where a given vessel was on a consistent and timely basis, but the tracks do give a sense of the approximate shipping route being used by the majority of the project vessels. Importantly, the ship tracks suggest that the project vessels only rarely travelled within the proposed ship track that was depicted throughout the EIS submissions and used for impact analysis, spill dispersion modeling, and marine mammal baseline work. The ship tracks submitted depict that Project vessels travelled significantly to the south of the proposed shipping lane throughout Hudson Strait and Hudson Bay. Only when circumventing Coats Island, either to the North, or the South, do the ship tracks submitted coincide with the proposed shipping lane, see Figures 2-5 (AEM, 2020e, p. 7-10).

The fact that ships servicing the mine did not generally travel within the proposed shipping route used for the analysis of shipping impacts poses important questions for the assessment of shipping impacts in the IA. In the early stages of the review while demonstrating concern over the inclusion of polar bear populations, and potential impacts due to fuel spills, GN suggested that the 5 km RSA on each side of the shipping lane was too small to account for even a moderate spill scenario (Government of Nunavut, 2013). The reality that Project ships did not travel within the proposed route during the 2019 season poses further questions about the importance of the 5 km RSA assigned around the proposed route, and calls into question the importance of having carried out the spill dispersion modeling along the shipping route described in Section 4.5.2.

In the submissions by federal agencies in response to AEM's annual reports, no agencies have mention, or noted any concern, regarding the disparity between the proposed shipping route and the ship tracks submitted by AEM. This suggests that potential shortcomings in the compliance monitoring of shipping related mitigation measures established for the project exist and suggests that it is possible that compliance with project specific shipping operational measures may be lacking.

4.7.1 Marine Monitoring Plans

In addition to monitoring ships, a marine wildlife monitoring program did not become a topic of conversation according to the documents I reviewed until after the submission of AEM's FEIS. It was only through a series of PC terms and conditions that marine monitoring programs and reporting procedures were established for the Meliadine project.

In an analysis of the FEIS, KIA pointed out that the Terrestrial Environment Management and Monitoring Plan (TEMMP) proposed by AEM did not include marine wildlife or birds. KIA was concerned about AEM's plan to have shipping companies carry out marine mammal monitoring as part of their standard operating procedures, suggesting that dedicated marine mammal observations were not typically conducted by shipping companies. In response, AEM suggested that birds should not be included, and clarified that shipping companies would only be asked to record incidental marine mammal data (AEM, 2014a).

KIA's Final Written Submission pointed out that AEM had not established a wildlife mitigation and monitoring plan that addressed marine species as called for in the EIS guidelines. In addition, KIA pointed out significant flaws in AEM's monitoring plan, such as that it trusted shippers to collect "incidental data," and that AEM had not described any concrete plans to monitor vessel traffic. KIA took exception with the wording used in the SMP in this regard, including: "should… whenever possible… encourage to collect… if available" when describing the monitoring plan (KIA, 2014, p. 24). KIA called on AEM to develop the marine components for the wildlife mitigation and monitoring plan, including the recommendation that trained observers and detailed plans for marine wildlife monitoring be used (KIA, 2014).

These recommendations from KIA were included as Project Certificate Conditions 81, 82, 84 and 85. Condition 81 called on the TEMMP and SMP to be revised to include plans for the involvement of local hunters in wildlife baseline studies and monitoring programs, to coordinate wildlife studies and monitoring activities with other organizations, departments and researchers, and measures to avoid and reduce the disturbance, injury, and mortality of marine mammals from shipping activities. Condition 82 called for the requirement of all contracted shipping companies to provide full-time trained marine wildlife observers for monitoring and the use of established data collection and recording protocols. Condition 84 and 85 addressed walrus haulouts and required the Proponent to gather information about walrus habitat and assess ways to monitoring disturbance to walrus at terrestrial haulout sites (NIRB, 2014a).

In response to these PC terms and conditions, AEM developed the Marine Environmental Management Plan (MEMP), which outlined the protocols for a Marine Mammal and Seabird Observation (MMSO) program. In accordance with Project Condition 82, the MMSO plan suggested that at least one trained marine wildlife observer would be present on-board mine shipping vessel during all transits within the RSA. The plan outlined in detail how observations were to be carried out, how sightings and relevant data would be recorded, and that communication between the MMSO and ship's crew would initiate mitigation measures as identified in the SMP. The MMSO plan also noted the value of adaptive management with KIA, HTOs and relevant regulators for the future (AEM, 2018a, 2018b).

The implementation of the MMSO program has been a slow work in progress. AEM's 2019 Annual Report included MMSO data from the first three years of the program. AEM suggested that observers had been present on 4 vessels during the 2019 season, representing an increased effort from the previous shipping seasons (AEM, 2020b), which was enough for NIRB to determine that AEM was in compliance with the condition (NIRB, 2020d).

Several Project terms and conditions were also included in the PC based on ECCC's final submission, which requested additional parameters for monitoring impacts to marine birds and species at risk along the shipping route. ECCC called for additional data to be collected, including any observations of marine birds, vessel-bird interactions, and any oily sheens on the water near vessels (AEM, 2014c), leading to the inclusion of Project Conditions 63 and 66, which required reporting on incidents of bird mortality and called on the improved TEMMP to include measures to ensure that all vessels are check for bird strikes after suspected events (NIRB, 2014a).

The lack of response planning and monitoring of potential interaction between marine wildlife and fuel spills was another area of concern demonstrated by ECCC and local community members (NIRB, 2014b), as well as GN with regard to polar bears (AEM, 2013a). ECCC recommended that AEM should identify steps that would be taken to protect wildlife from spills in their final written submission. Two related terms and conditions (#64 and #67) were included in the PC requiring the development of a framework for monitoring marine birds species and habitat in the event of a major fuel spill, and called for an updated OPEP to include measures to avoid effects from spills on species at risk and migratory birds (NIRB, 2014a).

In accordance with these conditions AEM developed a framework for monitoring marine wildlife and habitat for marine fuel spill scenarios. This plan required shipping contracts to employ a qualified environmental professional to coordinate and oversee monitoring efforts after a spill event, including setting up communication with the nearest community, and conducting a series of surveys and sampling activities in order to note and assess any species directly in contact or in close vicinity of a spill. The plan calls for water, sediment and invertebrate sampling to be carried out as soon as possible to establish baseline conditions, the determination of the most critical resources to protect, and what mitigation measures could be used to do so. Following the immediate response, a daily monitoring and assessment framework describes different aspects of the spill to monitor. The follow-up phase implements a long-term monitoring framework in order to assess impacts to wildlife and habitat as a result of the spill and any cleanup measures implemented (AEM, 2018b).

As demonstrated in this section, the establishment of monitoring procedures for marine impacts and marine wildlife were only imposed upon the project at the last stage of the IA process. Based on the concerns of communities and several important agencies the requirements that established the basis of marine monitoring were established through PC terms and conditions. While this suggests that the concerns of communities and the KIA were taken into account, it also illustrates the hesitance of the proponent to establish and commit to marine monitoring without being compelled to do so by the NIRB.

4.8 Cumulative Effects

The conclusion drawn by the Proponent in the FEIS was that the cumulative impacts of the project were not predicted to have a significant influence on the abundance or distribution of marine wildlife populations, since the scale of the impacts were not expected to result in irreversible changes at the population level nor decrease the resilience of the marine VECs (NIRB, 2014a). Contrary to this stance however, the NIRB indicated in the Final Hearing Report that in the potential cumulative effects in the marine environment due to shipping were identified as a key area of concern with this project (NIRB, 2014a).

The assessment of cumulative shipping impacts in the IA focused on the regional increase in shipping and ongoing conversations about which other projects in the region to consider as reasonably foreseeable future projects. AEM originally asserted that Meliadine would not result in any net increase in shipping since new vessel traffic for Meliadine would be offset by the closure of the Meadowbank mine (AEM, 2013c). ECCC pushed AEM to quantify the expected increase in regional shipping due to the Meliadine Project and other projects with shipping through the Hudson Strait. AEM demonstrated that the Project was expected to add 9-14 vessels per year during construction, representing a 13-20% increase in shipping. Including other projects in the region AEM noted an expected increase in regional shipping by 48-52 vessel or 79-85% was feasible (AEM, 2013c).

Which additional projects to include, such as Mary River mine shipping, was an ongoing topic of conversation. With the inclusion of proposed shipping from Mary River through the Hudson Strait, AEM filed an updated cumulative effects assessment of project related shipping reflecting the addition of the approved Mary River shipping, stating that, "A larger increase in cumulative shipping levels is anticipated to occur in Hudson Strain than previously reported in… the FEIS (NIRB, 2014a, p. 232).

The Board ultimately expressed concern with the confidence levels with which

AEM presented predictions concerning cumulative shipping impacts, while maintaining that any effect on marine mammal populations would be offset by natural recruitment (NIRB, 2014a, p. 150). Several parties criticized AEM's assessment of cumulative shipping impacts in the later stages of the review. ECCC was the only organization to mention cumulative impacts throughout the review, with concerns regarding increased shipping on marine migratory birds, specifically mentioning "chronic ship-based pollution and cumulative disturbance" (AEM, 2013d, IR 125 p. 1), referring to pollution from regular ship operations, which otherwise went without a specific mention the entire review.

In their final submission, the Kivalliq Wildlife Board (KWB), Kangiqliniq HTO and Aqiggiq HTO emphasized cumulative effects of marine traffic, raised the concerns about the health of marine wildlife, and submitted that the FEIS downplayed the potential effects to marine wildlife. These groups called on AEM to revise their assessment of impacts to marine wildlife to reflect improved baseline data, better understanding of shipping interactions with marine wildlife, revised spill modeling, potential increase in shipping in the lifeline of the project, and reasonably foreseeable future projects (NIRB, 2014a).

KIA also proposed that the cumulative effects assessment had been weakened through the compartmentalization of potential impacts into groups and unrelated components. This critique was part of a general concern with the inadequacies of the shipping assessment, including the marine baseline and modeling of fuel spills, which have been addressed throughout this chapter. KIA recommended strengthening these areas of the shipping analysis to avoid allowing the marine baseline to "shift unchecked, increasing risk of lasting environmental damage" (KIA, 2014, p. 34).

The Final Hearing report also demonstrates the ongoing concerns of local community members with shipping impacts generally, and cumulative impacts over time. The NIRB ultimately agreed with the sentiment of these concerns, and suggested that significant uncertainty characterized the cumulative shipping effects assessment of the project (NIRB, 2014a).

Several terms and conditions were imposed on the project approval which addressed cumulative effects, such as Condition 68 specific to marine birds, and

Condition 86, which stated that the "Proponent is encouraged to liaise with relevant stakeholders, regulatory agencies and/or forums... that might allow for participation in relevant research and management initiatives and increasing understanding and mitigation of potential cumulative effects associated with the Project's shipping activities through the Hudson Strait" (NIRB, 2014a, p. 272).

The 2019-2020 Annual Monitoring Report for the Meliadine Project suggests that AEM has yet to come into compliance with the Conditions 86 and 68 (NIRB, 2020d). Specifically with reference to Condition 68, NIRB noting that "no analysis on cumulative effects from shipping activity is present within the annual report" (NIRB, 2020d, Ap. A p. 17).

4.9 Summary

The purpose of this chapter was to outline the extent to which shipping impacts were included and analyzed in the IA of the Meliadine Gold Project. There are several important findings to highlight here in this regard.

First, the marine activities associated with the project were included in the scope of the assessment and marine related VECs were identified for impact analysis. The potential impacts of shipping activities were identified in the EIS developed by AEM, along with mitigation measures and operational parameters designed to minimize and avoid potential shipping related impacts.

Second, Inuit organizations and community members documented a significant level of concern regarding the known and potential impacts of shipping activities. In additional to local communities, notable shipping related input was submitted by ECCC and KIA. A noteworthy trend throughout the IA for the Meliadine project is that the shipping related requirements of the proponent were continually increased throughout the process as additional concerns and requests were voiced by participating organizations. As was suggested throughout this chapter, many shipping related Project Certificate terms and conditions called on the proponent to continue to modify and update the marine baseline, impact and analysis, management plans, and monitoring frameworks.

This chapter has shown that the concerns and comments of participating agencies and local organizations are of crucial importance in the IA process in Nunavut, since they helped shape the extent to which shipping impacts were addressed in the IA in tangible ways. This demonstrates that the IA process is flexible in designing outcomes and developing parameters to address the potential risks of project-based shipping.

Several important shortcomings of this IA are worth reflecting on as well. First, the project-based mitigation measures designed in the IA to reduce the likelihood of shipping impacts were limited to speed restrictions for vessels, setback distances from wildlife and important ecological areas, and an onboard marine wildlife observation program. Measures that went beyond simple precautionary operational measures, such as specifications for Arctic conditions, pollution prevention and discharge measures, spill response provisions, and route planning were not addressed in the IA in a way that resulted in any additional project-specific measures that went beyond the requirements of the regional regulatory frame for shipping. Notably, the development of the Meliadine mine did not include any project specific spill response capacity measures that went above the regulatory requirements for the Itivia OHF.

Second, the overall analysis of specific shipping related impacts were analyzed in the IA with limited site-specific data and limited physical data collection. The exercises used to establish marine baselines and to model the potential impacts of shipping were few, and when carried out, were based on literature and desktop exercises. Impact prediction is an important stage in the IA process as the risk, likelihood, and significance of impacts to the human and natural environment are needed in order to quantify and address the full impact of a development project (Noble, 2015). However, according to Noble (2015), predicting impacts is complex, uncertain, and "rarely done well" (p. 120).

Third, the modeling carried out for potential fuel spills remained focused on diesel, the main hydrocarbon shipped as cargo to the mine, and did not include modeling of any additional fuel types such as the intermediate or heavy fuel oils that are likely carried on project ships for propulsion. As suggested in the literature, different types of fuel come with significantly different properties, which result in variations in the severity of impacts to the marine environment. Lighter fuels, like marine diesel are extremely toxic to wildlife, but are volatile, easily dispersed and broken down by bacteria relatively easily. Heavier oils on the other hand, like the fuels commonly used to propel ships are much less volatile and may persist as oily mixtures of water and tar for a long time, resulting in long-term environmental consequences. Heavy fuel oils (HFOs) are regarded as the most harmful fuel types used in the Arctic since they are particularly harmful and difficult to cleanup or disperse (DeCola et al., 2017). Given the important differences between the these types of fuel, and the fact that any oil spill would pose a significant and serious risk to the Arctic marine environment and the people who live in the region (Dawson et al., 2018), it is a shortcoming of this IA that concerns over additional fuel types beyond marine diesel were not brought forward in the assessment.

Similarly, ship-based pollution resulting from regular operations remained largely unaddressed in the IA. Lindgren et al. (2016) describe how pollution from ships is not solely the result of large-scale spills, but that ships spill and leak oil as part of regular operations, making some pollution from ship activity inevitable. Beyond the mention of chronic ship based pollution from ECCC, described in Section 4.8, the majority of concerns and discussion around impacts from hydrocarbon pollution were focused on single spill events.

Additional concerns regarding the enforcement capability of federal agencies to monitor adherence to project mitigation measures did not garner the level of concern that it may be justified given the literature that suggests for example, that the lack of enforcement in global shipping is a gap that needs to be addressed (Lindgren et al., 2016), and that practical concerns regarding compliance monitoring and the enforcement of shipping legislation and project-based shipping measures, specifically in the context of the Canadian Arctic, is warranted given the lacking presence of federal regulators in the region (Thiessen et al., 2020).

The assessment of cumulative shipping impacts of the Meliadine project was another area of weakness in the IA. The lack of detail in the assessment of cumulative impacts was a trend identified across the projects studied in this research project, and us such is addressed in more detail in Section 5.4.2.

According to the Final Hearing Report for the Meliadine Gold Mine Project, the assessment of shipping impacts and the mitigation and monitoring programs established through the review and the improvements imposed on the Project Certificate as terms and conditions of approval were adequate to satisfy the concerns of the participating parties and local organization that took part in the review (NIRB, 2014a). However, given the concerns of local communities and other organizations, it remains questionable whether the IA did enough to address the potential impacts of project shipping.

As suggested in the Final Hearing report, regional concerns around shipping remain. L. Muckpah from the KWB presented these concerns as follows, suggesting that one must:

> "Consider project related marine shipping as incremental, cumulative traffic in a context of great uncertainty, and poor understanding with respect to the impacts of shipping on marine mammals and the underwater environment. The focus of a gold mine project proposal is necessarily placed on the terrestrial environment, but Inuit in coastal communities cannot afford to lose sight of the marine environment. Consequently, an increase in shipping intensity raises concerns, previously voiced by the Chesterfield HTO for the continued health of marine mammal, fish, and bird populations.
> Although strictly project specific, marine traffic is not of an extraordinary scale, [it] must be considered with an additional increment to the cumulative shipping related stresses on the marine environment off the shores of the Kivalliq. Given how little understanding of the impacts of shipping on marine mammals and the underwater environment either Inuit Qaujimajatuqangit or western science can provide, it is more crucial to do so" (NIRB, 2014a, p. 230-231).

The NIRB reiterated this sentiment as well, acknowledging the fact that the scale of marine shipping for this project was relatively limited as it was confined to resupply activities during the open water season using the existing community resupply route, but also recognized that Project shipping would traverse sensitive wildlife areas resulting in significant public concern with the proposed marine activities of the Project. The Board cited a need for greater dialogue between Nunavut communities, government agencies and departments, and parties with responsibilities for the management and protection of marine wildlife and habitat regarding shipping in the NSA (NIRB, 2014a).

Several PC Terms and Conditions show an attempt from NIRB to create space for dialogue between parties and local communities to continue around the management of shipping activities in the region. For example, Condition 127 called on the Proponent to provide updates to its SMP regarding adaptive management measures to be employed if effectors monitoring identified potential for effects on marine mammal populations along the shipping route, and to do so in coordination with the KIA and Kivalliq HTOs (NIRB, 2014a).

The extent to which greater dialogue and ongoing adaptive management will take place in an effective manner with tangible outcomes remains to be seen. For the Meliadine Gold Mine, the impact analysis, shipping impact mitigation and monitoring established by the proponent, and improved through the terms and conditions added to the Project Certificate, were understood to adequately address the regional and environmental concerns associated with project shipping. As such, the NIRB recommended the project to proceed in accordance with them (NIRB, 2014a).

Chapter 5: IA in Nunavut and the assessment of shipping

5.1 Introduction

In this chapter the assessment of shipping in the Meliadine IA is compared with the assessment of shipping in the secondary cases selected for this research project. As such, this chapter attempts to place the Meliadine IA within the larger regional context of IA and resupply shipping in Nunavut, and offers several trends and findings from across these projects that help describe the extent to which project IA in Nunavut has identified and addressed potential impacts of project shipping.

Table 5.1 provides an overview of the projects considered in this chapter. The PC number for each project is listed, along with the year of approval, and any amendments that correspond with expansions to the original project. Figure 5.1 below, depicts the locations of the projects in relation to one another.

Table 5.1: Overview of selected projects

Project Name	Project Certificate and date issued		Project Proponent	Closest Community	Project Amendments
Meadowbank	No. 004	2006	Cumberland / AEM (as of 2007)	Baker Lake	Vault Pit Expansion Am. (2016)
Mary River	No. 005	2012	Baffinland	Pond Inlet	Early Revenue Phase Am. 1 (2014) Production Increase Am. 2 (2018) Expansion Request Am. 3 (2020)
Meliadine	No. 006	2015	AEM	Rankin Inlet	
Whale Tail	No. 008	2018	AEM	Baker Lake	Expansion Am. (2020)
Mary River Phase 2	On going	On going	Baffinland	Pond Inlet	

Figure 5.1: Locations of the resource development projects

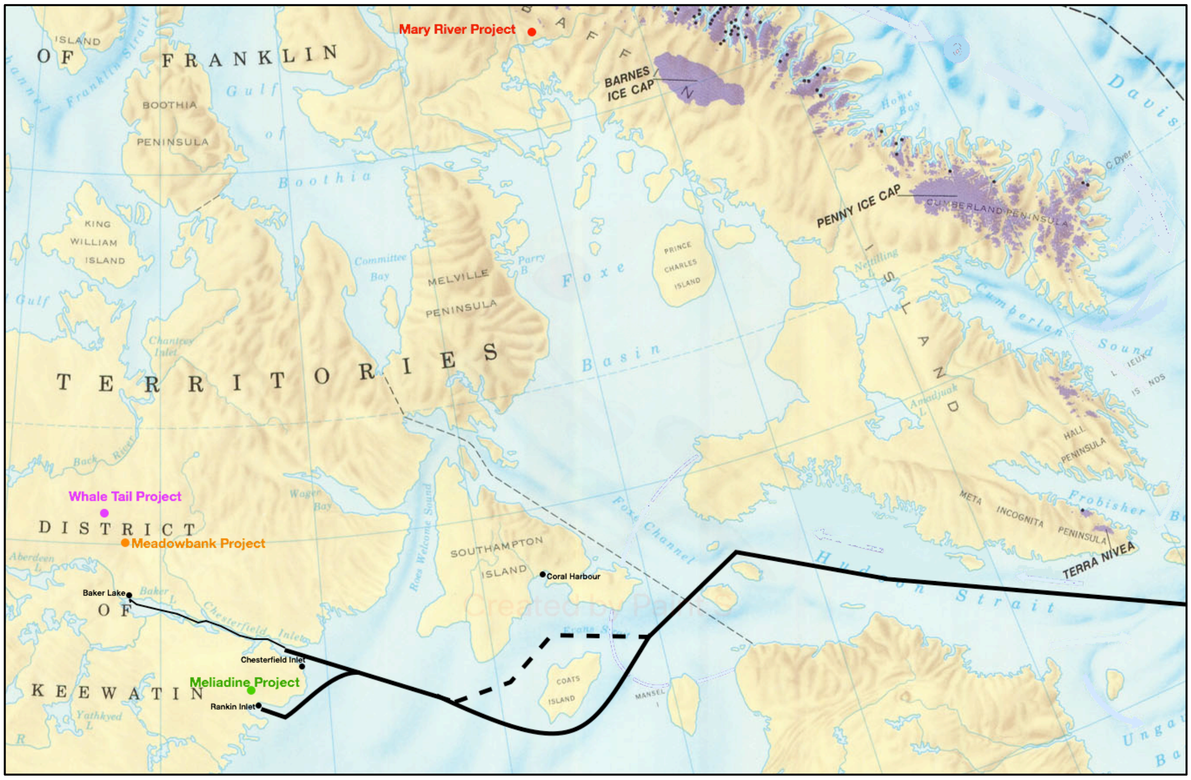


Figure 5.1 Depicts the approximate locations of the four resource development projects cited throughout this thesis. The AEM mines in the Kivalliq region are depicted as follows: Meliadine in green, Meadowbank in orange and Whale Tail in pink. The approximate location of the proposed shipping route to the AEM mines is indicated by the solid black line – the dashed line representing the "secondary route" to the north of Coats Island. Important communities mentioned throughout the thesis are located and identified in black. Additionally, the Mary River project is located in red on the top of the middle of the figure – no shipping route is included for the project. Alterations to the map were made by thesis author, open source map from Natural Resources Canada (2017).

5.2 Description of the secondary cases studied

The following section offers a brief description of the secondary cases studied, including the Meadowbank and Whale Tail Projects in the Kivalliq region, followed by the Mary River Project. A detailed review of the events of the IA for the Meliadine Project is found in Chapter 4.

5.2.1 Meadowbank Gold Mine Project Description

The “Meadowbank Division,” refers to a series of mineral developments near Baker Lake, in the Kivalliq Region of Nunavut. In 2003, Cumberland Resources proposed the original Meadowbank mine, planning to operate one open pit gold mine about 70 km north of Baker Lake. The shipping components of the project were limited to mine resupplying during the open water season (NIRB, 2020a), and the IA for this project was carried out between 2003 and 2006 with relatively little inclusion of shipping impacts. Since 2007, the Meadowbank project has been owned and operated by AEM (NIRB, 2017a).

Throughout the IA for the Meadowbank project, the Proponent described the shipping components of the Project in simple terms. In the 2005 EIS, Cumberland mentioned several potential impacts from shipping, including those due to barge traffic in Chesterfield Inlet, ship noise, and potential fuel spills, but addressed these impacts by relying on ships to “follow standard marine shipping procedures during the Hudson Bay open water season” (Cumberland Resources, 2005, p. C-17-52). Beyond this assertion, the shipping components of the project were not addressed in the FEIS since no marine VECs were identified in the review (NIRB, 2017a).

Although shipping impacts were not addressed in the FEIS, shipping related concerns were prevalent in the IA. The Final Hearing report documented concerns from local communities regarding the threat of fuel spills and potential shipping impacts on marine mammals. The concerns regarding marine mammals were reiterated by numerous submissions from DFO, and in response, Cumberland established and committed to a series of shipping related provisions, which offered some additional parameters and oversight to the Project’s shipping component (NIRB, 2006).

Many of these provisions were based on the regulatory requirements for regional shipping such as hiring only TC certified shippers, requiring onboard spill equipment, and following all notification procedures. Additional provisions were based on the concerns expressed in the IA and went beyond simple operational procedures. Examples of these provisions included commitments to carry out workshops to discuss shipping procedures and spill response with local communities, the use of local onboard wildlife monitors on project vessels carrying fuel, requesting shipping companies practice deploying their spill equipment in the Inlet, and including parameters to give wildlife the right of way. In addition, annual shipping consultation visits in Chesterfield Inlet were included in order to report and listen to concerns and comments regarding project-related shipping (NIRB, 2006).

The Project Certificate for the Meadowbank Project (No. 004) was issued in December 2006 (NIRB, 2020a). Included in the NIRB's recommendation to approve the project was an emphasis on the importance of minimizing and monitoring ship traffic, and commitments to safe shipping and emergency preparedness. The shipping related provision described above were included in the Project Certificate as terms and conditions of approval (NIRB, 2006).

Since the original approval of the Meadowbank project, AEM has proposed several expansions to the project. These include the Vault Pit expansion, approved in December 2016, and the Whale Tail Pit Project, addressed in Section 5.2.2. The Vault Pit expansion was carried out in an expedited fashion, and treated as an expansion to the mine life of the Meadowbank Project. The shipping components of the expansion were understood as a continuation of the current shipping required for Meadowbank, and as such the resulting amendment of the Project Certificate No. 004 did not result in any changes or additions to the shipping management for the project (NIRB, 2016a). The Vault Pit expansion had a short mine-life, with active mining coming to completion in March 2019 (NIRB, 2020a).

5.2.2 Whale Tail Pit Project Description

In 2016, the Whale Tail Pit Project was proposed as an expansion to the Meadowbank Project. This expansion was much more significant than the Vault Pit expansion described above, and involved the development of a new open pit mine about 50 km northwest of the Meadowbank site. The expansion proposed to continue the use of the existing barge unloading facilities at Baker Lake and the continued use of the milling infrastructure at the Meadowbank mine site. Given the new spatial scope of the project, the Whale Tail proposal was reviewed by NIRB as a unique Project, and not as an amendment to the existing Meadowbank project (NIRB, 2017a).

Although assessed as a unique project, many aspects of the Whale Tail IA built upon the Meadowbank and Meliadine IAs. For example, AEM stated that the same list of VECs selected for the 2005 Meadowbank FEIS would be used for the Whale Tail IA, and that “Based on the pathway analysis approach to the effects assessments, and IQ collected, the Proponent did not identify the marine environment as a valued component for the Project…” and predicted that the Project would not result in significant impacts to the marine environment (NIRB, 2017a, p. 141).

Significant concerns from Baker Lake and Chesterfield Inlet HTOs and community members presented the observed effects of existing project shipping on marine mammals in the Inlet and the feared future impacts related to this proposal (NIRB, 2017a). Potentially due to these concerns the shipping components of the project were included in the EIS. The entirety of the shipping corridor through the channel of Chesterfield Inlet, Hudson Bay, and Hudson Strait to the edge of the NSA was included in the spatial scope of the assessment, potential shipping related impacts were identified and mitigation measures were proposed to address them (NIRB, 2017a). In a marine appendix of the FEIS, a limited list of marine VECs were established, including marine water quality, marine fish, marine mammals and marine birds (AEM, 2016).

The analysis of shipping related impacts presented in the 2016 Marine appendix for the Whale Tail FEIS was based heavily on the analysis and outcomes presented in the FEIS for the Meliadine project. The spill dispersion modeling carried out for the Meliadine project was summarized and described in the Whale Tail FEIS, citing that “qualitative inferences can be made to apply this information for assessing the potential impact from a spill on the marine environment and establishing a [geographical] ‘hypothetical spill limit’” (AEM, 2016, p. 3-A-8). AEM suggested that a spill in the channel of Chesterfield would spread rapidly in the downstream direction and would reach the shoreline within hours if no action was taken, but that a spill in open water would act much as was suggested in the dispersion modeling cited (AEM, 2016). In terms of data it appears the Whale Tail FEIS relied solely on the data collection carried out for the Meliadine IA.

The assessment of project shipping for the Whale Tail Project was largely understood as a continuation of the existing shipping requirements of the Meadowbank project (NIRB, 2017a). The inclusion of shipping considerations in the IA represented a significant increase over the level of inclusion in the original Meadowbank project, while at the same time presenting an analysis that was less detailed and heavily based on the analysis and shipping programs AEM established through the IA of the Meliadine Project.

A new Project Certificate, No. 008, was issued for the Whale Tail Project, while the Certificate for Meadowbank, No. 004, remained applicable to the Meadowbank division as a whole. The majority of the shipping related PC terms and conditions from PC No. 004 were maintained, while additional terms were imposed on No. 008 addressing shipping activities to a greater extent than the original PC No. 004 (NIRB, 2017a).

Several new conditions of note included in PC No. 008, are condition #37, compelling AEM to maintain the SMP in coordination and consultation with authorities, KIA, and HTOs of the Kivalliq communities; Condition #38, which called for ship routing to avoid sensitive habitat areas and use the route south of Coats Island as the primary shipping route; and Condition #42, regarding designing monitoring programs to ensure that local users of the marine area have the opportunity to provide feedback and input in relation to monitoring and evaluating potential project-induced impacts and changes in marine mammal distribution (NIRB, 2017a).

Construction began in 2018 and full commercial production was achieved by September 2019 - around the time that active mining at the Meadowbank site had been completed. A further amendment was issued to the project certificate for the Whale Tail Project in 2020 involving the development of an additional open pit and underground mine (NIRB, 2020a).

5.2.3 Mary River Iron Mine Project Description

The Mary River iron mine, situated on the northern portion of Baffin Island, is owned and operated by Baffinland Iron Mine Corporation (Baffinland), and is the largest mining development ever proposed in Arctic Canada (Baffinland, 2018a). As originally assessed and approved, the project involved the mining of 18 Mt of iron ore from a single open pit, the transportation of the ore by rail to a port site at Steensby Inlet, and annual marine shipping of the ore to European markets via year-round shipping through Foxe Basin and Hudson Strait. In addition, an existing port facility from the exploration phases of the project in Milne Inlet was to be used for mine resupply and fuel shipments for the Project during the open-water season (NIRB, 2020c).

Since the original approval of the Mary River Project in 2012 (PC No. 005), significant alterations to the project have been proposed and assessed by the NIRB. The first of these alterations began with Baffinland's application for an Early Revenue Phase in January 2013. This phase was proposed in lieu of the declining price of iron ore and would allow Baffinland to transport ore through the existing Milne Inlet port to raise the necessary funds to develop the southern route originally proposed. Following an assessment of the proposed changes, the NIRB issued an amended Project Certificate in May 2014, allowing up to 4.2 Mt/a to be shipped using the northern shipping route through Milne Inlet and Eclipse Sound (NIRB, 2020c).

In October 2014, Baffinland submitted the "Phase 2 Development Proposal" to further amend the Mary River Project by increasing the transportation of ore through the northern route. The proposed changes included an expansion of the port site at Milne Inlet, and the increased production and transport of iron ore from 4.2 Mt/a to 12 Mt/a (NIRB, 2020e). At a later date, additional components were proposed such as a northern railroad to Milne Inlet (NIRB, 2020c).

During the ongoing review of the Phase 2 Proposal, Baffinland submitted a production increase proposal to the NIRB in 2018, requesting an increase to the allowable production and shipment of iron ore through Milne Port from 4.2 Mt/a to 6

Mt/a. The federal decision-maker recommended that the proposal proceed subject to revised terms and conditions (NIRB, 2020c).

The terrestrial transport and marine shipping components of this project have been a significant area of concern for the participants and local community members throughout the proposals assessed in relation to this project. According to NIRB and DFO, and supported by many of the participating parties, the scale and frequency of the proposed shipping operation, and use of a year-round shipping season presented the potential for substantial environmental impacts in the region (NIRB, 2012b). This determination, and the ongoing concerns with the marine components of this project, resulted in significant attention and detail in the analysis of shipping impacts for the project. The Final Hearing Reports and recommendations from NIRB at every stage of the development of this project have continually emphasized that the Mary River Project represents an unprecedented development for Nunavut, and Arctic Canada as a whole (NIRB, 2012b, 2014c, 2018).

Due to the severity of the potential impacts of the shipping components of this project, and the heightened risks and concerns that accompany them, the assessment of shipping impacts for the Mary River project have been carried out with significantly more detail and for a much wider swath of potential impact pathways than any of the other IAs I looked at. Significant concerns were documented regarding the effects of continual ship noise on marine mammals, shoreline wake effects, risks of marine mammal interactions and potential fuel spills into the marine environment. Compounding the risks is the importance and distinctiveness of Eclipse Sound (traversed through the northern shipping route) as one of the most important narwhal marine habitat areas in the entire Arctic (NIRB, 2012b).

Along with the widespread potential marine impacts, an important theme in the approvals of the Mary River project along the way has been how to move forward in the face of significant uncertainty. For this reason, adaptive management was established as a fundamental component of the project, along with a significant emphasis on monitoring of project impacts (NIRB, 2020b). The NIRB suggested, in its final recommendation for the project in 2012, that given the high level of uncertainty around cumulative impacts, "the Board employed a more stringent formulation of the precautionary approach, proposing more baseline monitoring and calling for ongoing adaptive management planning" (NIRB, 2012b, p. 226). Many of the participating parties reiterated the importance of monitoring and adaptive management, such as Qikiqtani Inuit Association suggesting that adaptive management would be "a cornerstone for the success of this project, should it proceed" (NIRB, 2012b, p. 12).

Several important terms and conditions imposed on the 2012 approval reflected this emphasis on adaptive management. Most importantly, term #110 called for the establishment of a monitoring protocol to include short and long term, and cumulative effects monitoring to understand effects of vessel noise on marine mammals, and required early warning indicators to be established to ensure identification of negative impacts of ship noise on marine mammals. Term #111 also required the Proponent to establish clear thresholds and indicators of change to determine if negative impacts as a result of vessel noise were occurring as part of the mitigation and adaptive management practices (NIRB, 2012e).

Additional PC terms and conditions reflected the severity of potential impacts and the heightened concerns around shipping. Important terms included detailed requirements for baseline assessments, specific measures for ship track monitoring, sea ice information, spill response modeling and equipment, and the establishment of a Marine Environment Working Group (MEWG) as a way to include local perspectives in the shipping management for the project (NIRB, 2012e).

The assessment of the Phase 2 proposal has been contentious and controversial, with shipping and marine impacts of the expansions central to the concerns of local communities and organizations. In November 2019, the Final Hearings for the Phase 2 proposal were suspended via a motion from NTI regarding serious concerns about the project and a large number of unresolved technical issues between parties and Baffinland. The Final Hearing for the Project was rescheduled for Jan. 25 – Feb. 6, 2021 (NIRB, 2020e).

According to the Pre-Hearing Conference Report (Oct. 2020), many participating organizations suggested that significant progress had been made regarding the unresolved technical issues, but significant concerns remained. DFO, ECCC, and the local organizations and communities such as Pond Inlet and the

Mittimatalik HTO emphasized the shortcomings of the mitigation and monitoring plans for marine wildlife that had been implemented thus far, along with the lack of consultation with effected communities given that some level of impact was certain to occur (NIRB, 2020e).

The NIRB also noted lacking confidence in the adaptive management plans, indicating that Baffinland had not produced clear and effective plans to address shipping related impacts (NIRB, 2018). Many organizations and government agencies recognized that significant shortcomings in the adaptive management plans still existed during the review of the Phase 2 Proposal. Significantly, the MEWG, established to help address many of the concerns around shipping was described as ineffective, and the basis for the efficacy of adaptive management – the development of thresholds and indicators to warn of negative impacts to the environment, had not been established (Bernauer, Hostetler, & Harris, 2021; NIRB, 2020e).

After Phase 2 hearings were cut short by an outbreak of Covid19 in February 2021, a blockade was established at the airstrip for the Mary River mine by hunters who protested the expansion and the lack of consultation of local communities by the Qikiqtani Inuit Association and in the review process (Brown, 2021). The Final Hearings ultimately stretched into November 2021 because of delays due to the Covid19 pandemic and a decision has not yet been rendered. As can be clearly noted form the 2021 Public Hearings carried out in Jan-Feb and April, the uncertainties associated with the marine components of the Mary River project remain an area of critical concern for local communities (George, 2021; Venn, 2021). As final hearings came to a close, notable local organizations such as the Mittimatalik HTO based in Pond Inlet submitted statements in opposition to the Phase 2 expansion (Mittimatalik HTO, 2021).

5.3 Trends, themes, and outcomes from these IAs

The selected resource development projects that were considered for this research project span the time between the Meadowbank Project proposed in 2003, and the ongoing Mary River Phase 2 assessment in 2022. Several important themes emerged from the analysis and comparison of the shipping considerations in the selected cases. First, data showed a general trend toward the increased consideration of shipping in IA; second, the nature and scale of the proposed operations was identified as an important factor for the assessment of shipping impacts; third, the analysis of the IAs suggested that assessments built upon past reviews and influenced future IAs; and fourth, expansions or amendments to existing projects tended to assess shipping impacts with less scrutiny than new projects. These trends help inform the extent to which shipping impacts have been assessed within project-IA in Nunavut and are addressed in the following sections.

5.3.1 Increasing consideration of shipping impacts

A prominent theme that emerged when addressing the inclusion of shipping across the IAs studied is that the consideration and assessment of potential shipping impacts has increased markedly through time. As a whole, there is an increase in the attention given to shipping in the recent IAs, especially when compared with the original Meadowbank Project, approved in 2006. This increase in attention to, and consideration of shipping impacts is evident in a variety of ways.

The first important depiction of the increase in attention to shipping impacts can be seen in the scoping carried out for each IA. In the Meadowbank IA, shipping was effectively scoped out of the assessment. While some project-based measures were included in the PC, shipping was not analyzed to any extent in the IA, and the application of the existing federal regulatory mechanisms was the default method of shipping governance (Cumberland Resources, 2005).

The subsequent IAs for the projects in the Kivalliq region proposed similar shipping operations, but addressed shipping impacts and included shipping in the scoping of the IAs. Both the Meliadine and Whale Tail projects included the shipping route in the spatial scope of the assessment, and the VECs used for impact analysis included marine components. Corresponding with the marine VECs, potential impacts from shipping were analyzed, and mitigation and monitoring plans were established to address potential impacts (NIRB, 2014a, 2017a).

The increased attention to shipping impacts in IA is also illustrated in the requirements imposed on the recent projects in the Kivalliq region. In terms of PC terms and conditions, both the Meliadine and the Whale Tail projects included a significantly wider range and a more detailed list of shipping related terms and conditions than the Meadowbank PC. The Project Certificate (No. 004) issued for the Meadowbank Project in 2006 included 11 marine and shipping related terms and conditions. While a few conditions simply reaffirmed existing regulatory requirements for Arctic shipping, additional provisions were included due to regional concerns around shipping and included workshops to discuss shipping procedures with communities, wildlife monitors on ships, and parameters to give marine wildlife the right of way while in transit (NIRB, 2006).

When comparing this set of PC terms and conditions with the terms and conditions of the other projects, several important findings are worth noting. First, the basic set of terms and conditions included in the Meadowbank PC were also included in each of the PCs of the subsequent projects addressed in this research. As these terms and conditions were expanded upon in the IAs that followed, the set of project terms and conditions included in the Meadowbank PC can be understood as a basic set of project-specific conditions that have been applied to- and built upon in each project I considered.

The way in which the PCs of the more recent projects have expanded on the list of terms and conditions from the Meadowbank project is one illustration of how the understanding of the importance of shipping has changed through time. The PC for the Meliadine Mine (No. 006) was issued in 2015 and included 21 marine related conditions, a significant increase when compared with the Meadowbank PC. The basic conditions originally imposed on the Meadowbank Project were included, but so were significantly more detailed conditions regarding marine birds and habitat, shoreline impacts, spill prevention and modeling, and conditions calling on the Proponent to update and upgrade the mitigation and monitoring plans, baseline work, consult with local communities regarding ship route planning, marine mitigation, and monitoring plans (NIRB, 2015).

The 2017 PC No. 008 for the Whale Tail project again reaffirmed the existing basic set of terms and conditions from the Meadowbank Project and added several new terms. In total 18 marine and shipping related terms were included in this certificate. While the Whale Tail project does not depict much of an improvement over the Meliadine PC in the assessment of shipping impacts, several notable terms and conditions were included that demonstrate increasing attention to shipping components. For example, Whale Tail conditions #38 called for AEM to maintain the shipping route to the south of Coats Island as the primary shipping route (NIRB, 2017a), which had been an ongoing preference of Coral Harbour and had been documented in previous IAs. Including this request as a PC condition showed an evolution from Meliadine to Whale Tail.

In comparison with the projects in the Kivalliq region, the Mary River project is a significant outlier, as the unprecedented shipping operation required for the project resulted in a significantly further reaching set of terms and conditions. The PC (No. 005) for Mary River included 86 marine and shipping related terms and conditions that address many shipping related components, such as ice breaking, shoreline impacts, ballast water, ship noise, blasting, and significantly more procedures specific to monitoring and mitigation, and the inclusion of local communities in shipping related decision-making (NIRB, 2020b). The affect that this project had on the assessments in the Kivalliq region that came after it is discussed in Section 5.3.3, below.

Beyond the scoping and PC outcomes of the projects, several interview participants also suggested that the attention to shipping concerns and potential impacts has increased through the years. For example, a participant from CIRNAC suggested that through IA processes the spill response preparation in communities and the awareness of regulators has increased. Similarly, the participant from KIA suggested that the scientific capacity to understand marine impacts has increased through time. When asked about the differences between the assessment of shipping from Meadowbank to Meliadine, the participant suggested it had improved significantly, saying “now you have ongoing research, you have ongoing monitoring… [and] members of the community have been consulted by the Proponent.”

5.3.2 The scale and nature of the shipping operation

A second theme that emerged from the review of these IAs is the importance of the scale of the shipping operations being proposed. This was most evident when comparing the ways in which shipping was assessed in the Mary River project with the developments in the Kivalliq region.

As an iron ore mine, the scale and nature of the shipping operation at the Mary River project differs in important ways from the shipping requirements of a gold mine, such as those studied in the Kivalliq region. In addition to mine resupply, the shipment of iron ore greatly affects both the scale of the shipping operation in terms of the volume and frequency of vessel transits, and the nature of the operation through numerous additional impact pathways not applicable to resupply operations during the open water season. These additional effects pathways include impacts due to (1) ice-breaking, including potential impacts on wildlife, ice regimes, and travel of local people; (2) issues with ballast water, as ships would be arriving at the mine port sites empty in order to haul ore; (3) the scale of shipping and associated impacts on marine mammals such as noise; and (4) additional complications in the regulatory arena with ore loading facilities and the use of foreign flagged ships (NIRB, 2020b).

The immense difference between these projects can be demonstrated by comparing the shipping requirements in each case. As described in AEM's annual reports, 9 vessels serviced Baker Lake for the Meadowbank project during the 2019-shipping season (NIRB, 2020a), while 12 vessels serviced the Meliadine mine (AEM, 2020b). In comparison, the shipping operations proposed for the Mary River project are of an entirely different scale. In 2017 during the early revenue phase, 56 vessels transported 4.1 million tones of iron ore from the Mary River mine, representing the largest shipping program ever in the Canadian high Arctic (Baffinland, 2018a), and in the Mary River Phase 2 proposal, Baffinland indicated that a maximum of 176 ore carriers would be used to ship 12Mt of iron ore within a six month shipping season (NIRB, 2020e). With the addition of up to 50 ships for routine mine resupply, WWF Canada suggested that this would represent a total of close to 450 one way transits to Milne Inlet in a six month window (WWF Canada, 2019).

There are obvious reasons why the scale and nature of the proposed shipping operation would result in different levels of scrutiny in IA. As described by Milne & Bennett (2016), basic assessment methods focus on the most significant of the potential impacts, while Jones & Morrison-Saunders (2016) submit that IA should be primarily concerned with focusing on key impacts, implying that project impacts vary in their decision-making importance, and that all impacts should not be considered to the same level. Nevertheless, the nature and scale of shipping operations is an important factor that helps explain significant differences between the assessment of shipping in the Mary River IA and the IAs for the AEM mines.

As is suggested in the literature on shipping risk, increased shipping is accompanied by increased risk of pollution and environmental degradation (Gulas et al., 2017; Marty et al., 2016; Wilkinson et al., 2017; WWF Canada, 2014, 2017). Further, Marty et al. (2016) suggest that in addition to amount of traffic, the density of vessel traffic in a given area is another important factor in quantifying the risks of shipping. Both the total number of ships proposed for the Mary River mine, and the frequency of transits through Milne Inlet and Eclipse Sound during a six month shipping are cause for serious concerns from government agencies and local communities (NIRB, 2012b, 2018; WWF Canada, 2019).

As a result of the concerns and potential impacts of the Mary River project, the baseline work addressing marine mammal populations, shoreline characteristics, ice regimes, benthic and aquatic studies were carried out with significantly more detail than the other IAs studied for this research. In addition, the assessment of shipping in the Mary River case has resulted in a more detailed approach as a whole, and has resulted in more ambitious mitigation and monitoring plans for project shipping (NIRB, 2012b). There are numerous ways in which the extent to which shipping was considered in the ongoing IA of the Mary River project can be linked to the enormous scale of the proposed operation, as the following important examples highlight.

First, numerous organizations were involved in the IA for the Mary River mine that were not involved in the IAs of the Kivalliq region. These additional organizations include non-governmental organizations such as WWF Canada and Oceans North, who contributed significant expertise to the assessment of shipping for Mary River and brought additional emphasis and scrutiny to the shipping management for this project (NIRB, 2012b, 2020e; WWF Canada, 2019). Also of note in this regard, is the inclusion of parties from beyond the jurisdictional boundaries of Nunavut. These include the Makivik Corporation established by the Nunavik Land Claims Agreement (NIRB, 2012b), and the involvement of Greenland due to their concerns regarding the amount of shipping along their coast (NIRB, 2020e).

In the Mary River IA, an invitation for input was extended to the Makivik Corporation due to the expected incursion of project vessels into the Nunavik Marine Region (NMR) of the Hudson Straight. The Makivik Corporation expressed concerns about vessel routing and ice breaking within the NMR, suggesting that project ships should remain within the waters of the NSA (NIRB, 2012b). The inclusion of the Makivik Corporation illustrates the importance of the scale of the operations since the Makivik Corporation was not involved in any of the IAs for the developments in the Kivalliq region, even though it is evident from the shipping monitoring reports from AEM that project ships travelling to the Meadowbank/Whale Tail and Meliadine projects traverse waters within the NMR with every pass through the Hudson Strait, see Figures 2-5 (AEM, 2020e) and Figures 3-6 (AEM, 2020c). The inclusion of the Makivik Corporation in the Mary River IA illustrates that the scale of shipping (frequency) and the nature of the operation (ice-breaking) greatly impacted the level of concern in the region.

Another instance that illustrates the importance of the scale of the operation is that the heightened perceived risk of potential shipping related impacts in the Mary River IA resulted in different outcomes than in the IAs in the Kivalliq region. A helpful example is PC condition #92 for Mary River, which stated that "The Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the Project in a self-sufficient manner" (NIRB, 2012e, p. 271). In response to this condition, Baffinland developed a three-tiered fuel spill response structure, including a Spills at Sea Response Plan, which outlines the capacity Baffinland has at the Milne Port site to respond to spills within the NSA, beyond the immediate vicinity of their OHF, through the use of line and tug boats to carry out marine fuel spill response (Baffinland, 2018b).

The identical term was included in the PC No. 006 for Meliadine (Term #77)(NIRB, 2015), but in this case AEM did not establish any equipment to respond to fuel spills beyond the direct vicinity of their OHF in Rankin Inlet (AEM, 2020d). NIRB monitoring reports suggest that AEM is in compliance with Term #77 given their compliance with the OHF regulations (NIRB, 2017b). Even though the identical term was issued for both projects, the outcome in each case was very different, with Mary River going above and beyond regulatory requirements for spill response as a result. The heightened perception of the risk of shipping due to the overall scale of shipping operations being proposed was undoubtedly a factor that dictated the diverging requirements of this term and condition.

The importance of scale was also addressed in the interviews carried out for this research. An ECCC participant suggested that the overall concern with shipping impacts in the Meliadine IA was much lower than the Mary River project in terms of the volume of shipping and risk associated with it, "I remember shipping being a really big deal in the Baffinland Project, and not so much with this one [Meliadine]. I think it had a lot to do with ship volume and the times of year that they were going to be shipping." The NIRB participant also commented on the difference between Meliadine and Mary River, saying, "this wasn't a Mary River Project where there was going to be year-round shipping - this is shipping to do with resupply… the Board did consider the magnitude of what that was going to be through its consideration."

5.3.3 IAs build upon and learn from previous assessments

A third trend that became evident when comparing the IAs for the Meadowbank, Meliadine, Whale Tail and Mary River projects concerned the extent to which these individual IAs built upon and influenced one another. Some examples of how this played out across these IAs have already been outlined in the preceding sections, such as the overlap between PC terms and conditions from one project to the next. In addition to the high level of influence from one IA to the next in terms of content and outcomes, it is also evident that a heightened conception of risk, or the perceived severity of shipping impacts can also bleed from one IA to the next, with important implications.

Within the trend of increasing consideration of shipping across the projects addressed in my research (Section 5.3.1), the role that the Mary River project played in drawing attention to potential impacts of shipping cannot be understated. The dramatic scale of shipping operation associated with the Mary River project and the heightened concerns regarding the shipping components of the project in the IA have pushed shipping further into the spotlight of resource development in Nunavut and influenced the IAs that followed. The different ways in which the Mary River project led to an increased consideration of shipping impacts in the NIRB assessments that followed the original Mary River project approval were evident through the documents reviewed and interviews carried out for this research.

The interview participant from ECCC described this link while discussing the Meliadine IA, suggesting, "I remember this review came after the Baffinland Iron Mine project and that was one of the first ones where we really looked in detail at shipping, so that probably prompted a lot of the concerns about this project," and later, "I'm certain that having gone through the Baffinland IA probably influenced our approach to the Meliadine IA." Further, in response to questions regarding the inclusion of shipping, the NIRB participant suggested that since Mary River was being considered at the same time and year-round shipping was being proposed at that time, concerns from Mary River had entered the Meliadine process. At numerous times the participant suggested that, "you're seeing input from Mary River," or "you are going to see that flavor from Mary River."

It is evident that the experience of the Mary River project influenced the attitudes of the parties in the Meliadine IA. This can be seen in the way that Meliadine and Mary River were differentiated in an EIS Guidelines Workshop during the scoping phase of the Meliadine IA. During this meeting NIRB suggested that, "some of the information requirements, should reasonably be toned down. A lot of the information requirements are from Mary River, I do agree that this could be toned down and adjust the expectations around [shipping]…" (NIRB, 2012a, p. 13). KIA affirmed this idea, saying "Put Mary River away, it is... year round, huge mine" (NIRB, 2012a, p. 13), and suggested that the focus should be on what had been learned since Meadowbank and on the regional area and scale of the Meliadine project, not Mary River. This was also reflected in the interviews carried out. The NIRB participant suggested that issues and concerns from the Mary River Project were coming into the Meliadine process, and "that was part of the reason, too, that Agnico-Eagle would be saying well we're not doing year round shipping, we're doing this window piece, we're not Mary River."

Beyond the perceived importance of shipping impacts, there was also a direct link between the Mary River and Meliadine IAs in terms of content. This is evident through a series of recommendations and suggestions made by parties in the Meliadine review that were based on similar provisions included in the Mary River assessment. For example, in the later stages of the Meliadine review, the KIA submitted a large set of technical comments directed at the marine components of the IA and suggested possible terms and conditions for project approval. Many of these suggestions were not only based on, but identical to terms included in the Mary River PC. For example, KIA (2014) recommended a condition identical to Mary River PC No. 005 Term #97 to improve the fuel spill dispersion modeling (NIRB, 2012e). This term was included in Meliadine PC as Term #78 and led to the detailed spill dispersion model carried out after project approval for Meliadine (AEM, 2018a). KIA also requested that AEM join the MEWG established for Mary River (Term #77) to allow for increased understanding of cumulative impacts (KIA, 2014).

Other areas of overlap included some of the provisions that have been included in each of these projects, notably the inclusion of shipboard observers and terms addressing marine mammal interactions in the marine environment. In relation to marine mammal observers in the Meliadine IA, the NIRB participant said, "we also took feedback from the Meadowbank project… there were some rapids that led into Baker Lake, that they really wanted to make sure that nobody navigated those wrong and that was where a shipboard observer program was emphasized…"

These same ideas are also applicable to the Whale Tail Project, the most recent project addressed in this research. From the document review and interviews carried out, it is very evident that the Whale Tail expansion was understood, in a practical sense, as an extension of the Meadowbank and Meliadine projects. The fact that AEM owns and operates these projects helps explain the tight links between them. As addressed in Section 5.2.2 above, the assessment of shipping for the Whale Tail IA was based heavily on the analysis carried out for the Meliadine IA, with no new analysis of shipping impacts or spill dispersion modeling carried out for the Whale Tail Project (AEM, 2016). Proposed as an expansion to the Meadowbank project, the high level of integration between the IAs of these projects, seen for example in the use the same list of VECs as the Meadowbank assessment (NIRB, 2017a), the Whale Tail project demonstrates a much higher level of linkage and influence than should be expected between unique projects, especially if these projects were operated by separate proponents.

The linkage and influence between the Meadowbank projects as a whole, the Mary River project, and the Meliadine project show that subsequent projects influence one another by using and building upon data presented in previous IAs, including concerns voiced, terms and conditions from previous IAs, and through the influence of increased or changing perceptions of shipping risks from other IAs.

5.3.4 Assessment of expansions and amendments to projects

Another theme identified through the document review and interviews is that assessments of shipping related impacts for expansions or amendments to existing projects may not be addressed with the same scrutiny or detail as new projects.

The Vault Pit Expansion is a simple example that illustrates this point. The Vault Pit project proposed a relatively small expansion to the Meadowbank project and was assessed as an amendment to the existing project. In the review, shipping was barely addressed, and the final hearing for the Vault Pit Expansion contained no mention of shipping operations or potential impacts, project-based or cumulative (NIRB, 2016a).

The description of the Whale Tail IA, proposed as another expansion to the Meadowbank Project, also supports this trend. As suggested above, even though it was assessed as a unique project, the assessment of shipping impacts in the IA was based heavily on the IA analysis and risk assessment carried out for the Meliadine IA. It is evident that the realized shipping levels associated with the development of the Whale Tail project were not accounted for accurately in the proposal.

In the Whale Tail IA, local communities were concerned with increasing barge traffic levels and unloading procedures in the Chesterfield Inlet area. In response, the Proponent suggested that the Project "would not result in an increase in marine shipping activities from the current shipping levels associated with the Meadowbank Gold Mine Project" (NIRB, 2017a, p. 146). However, when consulting AEM's annual reports, the construction of the Whale Tail project in 2018 and 2019 increased the barge trips into Baker Lake from between 35 and 39 per season, from 2011-2017, to 55 and 58 trips in 2018 and 2019 respectively (AEM, 2020f, Figure 37, p. 542). According to the 2019 Annual Report, the increase in 2018 and 2019 in comparison with the previous years was due to construction of the Whale Tail Project (AEM, 2020f).

The experience of these two project expansions points to the fact that expansions may be more easily justified than new projects. This may be due to that fact that a significant portion of the infrastructure is already in place, and that an extension of the mine life of a project has economic benefits. Either way, there is evidence to suggest that a continuation of ongoing levels of shipping for a project through an expansion is relatively palatable to local participants in IA, as opposed to increases in shipping levels due to new projects. The fact that shipping levels did increase because of the development of the Whale Tail Project may well point toward inadequacies in the assessment of the construction phases of these projects.

Breaking the mold when it comes to considerations of project expansions is the experience at Mary River. At each step along the way, through the early revenue phase, extensions, and Phase 2 proposal, shipping has been a serious concern for local communities, governmental agencies and other interveners (NIRB, 2018, 2020e). This is likely due to the magnitude of the shipping operations that were proposed and the dramatic alteration of the spatial scope of the project proposed by the early revenue phase and Phase 2 proposals.

The document review and interviews also revealed that the NIRB considered the potential challenges of assessing expansions to existing projects or a phased approach to development. For example, in the Whale Tail Final Hearing report, the NIRB addressed the fact that Whale Tail was proposed in order to continue using existing milling infrastructure at the Meadowbank site and to fill employment needs while future developments continued to be pursued. The board recognized that the Proponent “intends to actively pursue its exploration program and may consider bringing forward additional proposed projects to further extend the mine life of the Meadowbank Gold Mine… The Board notes that the phased approach to development that is typical of the way the Meadowbank project and most contemporary mining projects are developed highlights the need for, and importance of thorough cumulative effects assessments being provided to the Board…” (NIRB, 2017a, p. 225).

In the interviews, the participant from NIRB suggested that the proposals coming to NIRB in recent years are more often modifications to existing projects as opposed to new projects. The participant explained that, “a lot of Proponents are looking at larger projects but in a phased approach, and that's really challenging IA because it's not the way that projects were done in the past, or how legislation considered how projects were going to be done past or future” (NIRB Participant). This is an important topic for IA in Nunavut when it comes to cumulative impacts, as the NIRB participant also described how “Meliadine was proposed as the replacement for Meadowbank and now Meadowbank has more phases,” suggesting that the phased approach makes it difficult to assess the full scale of potential impacts.

5.4 Implications

When looking at the IAs of the four projects described above and the four trends identified when comparing the level of inclusion of shipping in each IA, several outcomes are worth mentioning. The following section addresses the four trends identified in this chapter and suggest and how they highlighting (1) the importance of learning within IA for continual improvement, and (2) the need for higher-level IA processes, such as SEA and REA to address shipping related concerns and impacts in the region beyond a single-project basis.

5.4.1 Learning in IA

As suggested in the literature, there is a growing interest in Arctic shipping from industry, researchers, and policy makers as the landscape of Arctic shipping changes (Dawson et al., 2020; Molenaar, 2009). It is well documented that vessel traffic in the Arctic has increased dramatically in recent years (Dawson et al., 2018), and this comes with cause for concern regarding shipping provisions in the Arctic, including emergency response, navigation aids, monitoring programs (Arctic Council, 2009; DeCola et al., 2017; Gulas et al., 2017; WWF Canada, 2017).

Corresponding with this growing interest, I found that there was an observable increase in the extent to which shipping considerations were addressed within project IA through time (Section 5.3.1). Importantly, this increase in attention to shipping impacts, and the concerns of stakeholders regarding shipping, suggests that there is space for continual improvement in the analysis of shipping impacts within IA. Improvements in the assessment of shipping impacts should result in better mitigation and monitoring parameters designed in the IA process, both through the uptake of new approaches and ideas into IA, and by learning from one IA to the next, as described in Section 5.3.3.

There is a significant body of literature describing the importance of – and opportunity for learning in IA. Different types of learning are well documented in the literature, such as single and double-loop learning. Single-loop learning involves learning within IA (Cruz, Veronez, & Montaño, 2018), and is described as learning that may result in improvements in fulfilling the purposes or requirements of IA (Sinclair, Diduck, & Fitzpatrick, 2008). Double-loop learning involves the evaluation of and changes to behaviours and attitudes that guide actions within IA, which might influence the objectives of IA as a process (Cruz et al., 2018), both in terms of the means used and the ends attained in IA (Sinclair et al., 2008). Double-loop learning could result in new or altered frames of reference for approaching IA (Sinclair, Diduck, & Parkins, 2022). Additionally, Sinclair et al. (2022) described triple-loop learning as an additional level, involving transformations in foundational values, perspectives, or worldviews.

Important learning outcomes through IA include knowledge and skills that can be acquired by individuals and organization participating in the IA process. Examples of these outcomes include how to design and manage projects that mitigate harmful effects and enhance benefits. According to Sánchez & Mitchell (2017), the quality of IA-related documents appears to have improved over time in many jurisdictions, and potential exists for mutual learning among developers to continue to improve IA performance in the future. The learning evident in my research, and described in Section 5.3.3 is largely single-loop learning, with outcomes that improve the understanding of potential shipping impacts and result in changes to project design, implementation, and impact management delivered through IA.

As described in Section 5.3.3 many organizations participating in the IAs in question looked to past IAs and voiced concerns and recommended content that had been included in previous IAs. The interview participant from ECCC reflected on this trend, suggesting that when addressing shipping in the Meliadine project, ECCC would have looked to past projects for what types of comments they made in the past and why. The participant suggested that, "I think it's kind of evolved from one project to the next, you kind of learn one thing from one IA and apply it in the next one."

Similarly, the NIRB participant also commented that the additional modeling requirements included in the Meliadine PC as a starting point for future improvements. The participant also suggested that "you are also seeing an influence from the Mary River project and lessons learned being brought into the Meliadine process. But it's also a way of the Board to look at and emphasize areas that require improvement with development happening in Nunavut."

The quote above suggests that IA is a work in progress, as suggested on numerous occasions by the NIRB participant. Additionally, the way that IAs are carried out and the way final hearing reports are written has evolved significantly in the years since the Meadowbank assessment (NIRB Participant). Understanding project-based IA as a work in progress points toward the importance of learning from and build upon work carried out in previous IAs. As suggested by Noble (2015), IA should be designed in a way that maximizes information inputs in order to come to the best possible conclusions. Therefore, looking to past IA processes is an effective tool for IA practitioners, and has several potential benefits.

First, learning from one IA to the next presents an opportunity for improvement in the management, mitigation, and monitoring of project-based shipping through time, by incorporating lessons learned in the past to improve management in the future. A participant from ECCC commenting on learning from one IA to the next suggested "I mean part of the thing is just getting people to report on the ship traffic so that the next project that comes along - you can have an idea what the baseline level is, and what is added to that, it helps in that way and it will probably help for future IAs."

In this regard Greig & Duinker (2011) suggest that it is "imperative that EIA ought also to contribute to ongoing learning about environmental effects through rigorous follow-up monitoring" (p. 160). Post-decision follow-up monitoring is crucial, as it allows for an understanding of the efficacy of IA outcomes for a given project to be determined. In addition, it allows for the consequences of a project to be understood, and enables an evaluation of whether IA goals have been achieved (Morrison-Saunders, Arts, Bond, Pope, & Retief, 2021).

Further, effective monitoring creates feedback loops necessary for learning from experience that should impact future decisions (Sinclair et al., 2008). Learning in the context of ongoing project management could also inform the management of other similar projects, should create the potential for sharing of data and methods between projects, and could lead to the integration of individual projects into higher level assessment as well (Morrison-Saunders et al., 2021).

As described in Section 5.3.3, I found that while each IA is unique, the IAs studied in this research demonstrated a high level of building upon one another, both in terms of content and requirements of IA, and the concerns documented. According to the literature, the way that the project IAs I studied built upon one another is unusual, and can be understood as a deviation from the norm. Sánchez & Mitchell (2017), suggest that failure to learn is common place both within a given IA process and when addressing subsequent development projects thereafter.

My findings are likely related to the contextual nature of resource development in the Arctic. Even though I refer to the AEM mines in the Kivalliq region as routine developments in comparison with the Mary River project, there are still very few mineral developments in the Arctic as a whole and any development in Nunavut is understood as novel, with many organizations pointing toward the jurisdictional and environmental challenges of proposing developments in the region. The overlap between project IAs and the level of learning from one IA to another may also be explained by the fact that there are only a few established project proponents and a handful of shipping operators currently active in the region. Crucially, several projects studied in this research are operated by the same proponent, helping explain why monitoring reports for the Whale Tail and Meliadine Project are aligned to a much greater extent than if the projects were operated by different proponents.

It is also possible that IA in Nunavut takes a slightly different approach than in other jurisdictions that may enable a higher level of integration between projects than may be the norm. The NIRB interview participant mentioned several times that the NIRB takes a holistic approach to resource development in the Territory. The broad scoping of project assessments to include all the communities in the Kivalliq region for the IAs of the AEM mines, for example, may have helped to broaden the scope of IA in Nunavut. Further, the participant described the NIRB as "a bit of a back catcher" as it is the first organization to look at a project proposal and also the last, carrying out ongoing compliance monitoring. When compared with other IA boards, this aspect of the NIRB mandate is unique (Peletz, Hanna, & Noble, 2020; Thiessen et al., 2020).

The NIRB participant described how lessons learned from the Mary River project were brought into the Meliadine process as a way for the NIRB to "emphasize areas that require improvement with development happening in Nunavut." These quotations from the NIRB participant suggest that in addition to carrying out project IA, the NIRB's role may extend to overseeing development in Nunavut more broadly, which may help explain the unexpected linkages between the IAs studied in my research.

If IAs effectively borrow ideas, recommendations, and management strategies from other IAs, the potential exists for significant improvements in mitigation, monitoring and understanding of shipping impacts in the marine environment to be realized. However, due to the understood failure of many organizations to learn through IA, whether by accident or by design, Sánchez & Mitchell (2017) suggest that IA could better be described as a potential learning process as the conditions that enable learning need to be better understood.

5.4.2 Cumulative impacts and REA/SEA

An important finding from the assessment of shipping in the Meliadine IA was that the consideration and assessment of cumulative effects on the marine environment was a particular weakness in the IA (Section 4.8). The secondary cases addressed in this chapter supported this finding, as cumulative impacts were also noted as areas of concern and shortcoming in these IAs (Section 5.3.4). Cumulative impact assessment was therefore identified as an area in need of improvement within project IA in Nunavut.

From the document review of the Meliadine IA it became evident that the assessment of cumulative impacts in the IA did not result in any significant new understanding of how additional shipping may impact the marine environment. As described in the Final Hearing report, AEM carried out a very standard cumulative effects assessment, with few significant findings. This was to the frustration of local participants such as K. Poole from KIA, who suggested, "…frankly, I think we can all agree that you could predict the outcomes of that habitat-based [cumulative] assessment even from the start before you put pen to paper, because they never came up with a significant determination" (NIRB, 2014a, p. 229). Though concerns regarding the uncertainty of cumulative shipping impacts were well documented, no substantial recommendations were made as to how to tackle these impacts.

There is noteworthy literature that suggests that project-based IA has limitations in assessing cumulative impacts. Sinclair & Doelle (2015) suggest that meaningful consideration of cumulative effects can be a challenge in project IA. Gondor (2016) also indicated that overlapping project impacts and cumulative effects of multiple projects in one area create challenges for project-based IA. In the context of IA in Nunavut, Barry et al. (2016) show that lacking land use plans create challenges for project-based IA in areas such as regional monitoring of cumulative effects, when clearly defined higher level guidelines for resource management are absent.

In some ways the following quote from Sinclair, Doelle, & Duinker (2017) accurately describes the extent to which cumulative shipping impacts were assessed in the Meliadine IA: "Once assessors enter the underworld of cumulative effects, they most often exit as quickly as possible, hoping that others (e.g., EIS reviewers and decision-makers) will sympathize with their unease and agree that cumulative effects are just too difficult to grapple with in a meaningful way" (Sinclair et al., 2017, p. 183).

Interview participants also described the challenges in mitigating and monitoring impacts of cumulative shipping in the region. As suggested by the ECCC participant, project-based shipping is fundamentally a cumulative effects issue, since, "all major mining projects in Nunavut would require shipping support, either to bring supplies in, or to ship materials out. It becomes a cumulative effects issue if there are more and more mines, and more and more shipping support needed." Participants also reflected concerns about the ability of IA to adequately address cumulative impacts. The ECCC Participants suggested, "to look at something as broad scale as shipping impacts - I'm not really sure that the monitoring program is in place to really assess the impacts."

In the context of Arctic shipping, Thiessen et al. (2020) suggest that project-based IA is not well positioned to assess cumulative increases in shipping traffic since IAs are only initiated by a minority of regional shipping operations. Community resupply and tourism for example are not subject to IA through the NIRB and therefore a key challenge for managing impacts of Arctic shipping in general is addressing the cumulative effects of not only increasing resource development, but other types of shipping as well.

These findings underscore the need for a regional environmental assessment (REA) or strategic environmental assessment (SEA) for shipping in the eastern Arctic. According to Noble (2015) SEA is a process that strives to integrate environmental impacts into higher order policy, plan and program (PPP) development. The rationale for the importance of assessment at the PPP level includes that many decisions that affect the environment are made long before project developments are proposed, and therefore actions and planning carried out at the PPP level can affect the nature and type of development initiatives that emerge down the line (Noble, 2015). By focusing on PPP, SEA can take on a proactive approach through implementation at the earliest possible stage of decision-making, and by looking at an entire region or industry, allowing for a more comprehensive analysis of potential impacts, making SEA more well suited to regional issues and cumulative effects assessment (Sinclair & Doelle, 2015).

Several interview participants made note of higher-level IA, such as the participant from ECCC who suggested that regional assessments and land use planning were areas where the regional scale of cumulative effects could be dealt with more effectively than on a project basis. In addition, the WWF participant explained that broad and effective IA is not happening at the moment as impacts are siloed or fragmented in project IA. A broader approach to IA could thus help "decision making further down the line, also you know, year over year, it's another tool to assess larger scale impacts..."

According to Sinclair et al. (2008), more effective consideration of cumulative effects through SEA or REA also creates the means by which lessons learned and data gained through project-based IA and ongoing monitoring could be integrated into future decision-making. With the additional use of higher-level assessment, project-IA would become one tool of several tools used to assess shipping, instead of the only tool used in the region. In that case, IA could provide an important resource for either SEA or REA and many of the questions regarding cumulative effects and shipping routes mentioned in project-IA could be addressed through higher-level forums. At the same time, existing higher-level assessments would also help project level assessment and the efficacy of cumulative assessment at the project level.

5.5 Summary

In this chapter several IAs for projects with shipping operations were compared, resulting in numerous findings that help illustrate factors that influence the extent and nature of shipping considerations within IA. Through comparisons with secondary cases, this chapter attempted to place the Meliadine IA within the larger regional context of resupply shipping and IA in Nunavut. In doing so, this chapter offers additional perspectives through which to understand the level of consideration found in the IA for the Meliadine project.

When looking broadly at the shipping related considerations in the IAs across the projects studied, it is evident that of the developments in the Kivalliq region the Meliadine IA included the most detailed analysis of shipping related impacts. Given the trend of increasing attention to shipping and the finding that expansions to existing projects (such as the Whale Tail project) are not assessed with the same scrutiny, it is logical that Meliadine represents the highest level of attention to shipping impacts of the mines in the Kivalliq region. In addition, beginning after the original assessment of the Mary River project also undoubtedly affected the Meliadine IA, as suggested in this Chapter.

In the majority of the interviews carried out for this project, participants suggested that the assessment of shipping in the Meliadine IA was sufficient given the level of risk associated with the project. For example, the ECCC participant suggested that, "yeah, I think it was probably reasonable given the level of risk… it definitely didn't go into much the same depth as for the Baffinland Project and I think that was reasonable in this case." Also, in relation to the scale of shipping operations for Meliadine, it was suggested by the participant from KIA that vessel traffic along the shipping route had not resulted in any impacts on marine mammals.

Further, it was suggested that the relatively routine nature of the shipping operation associated with Meliadine meant that relatively routine measures to address shipping impacts through the regulatory regime would suffice (CIRNAC Participant), as is evident in the spill response planning.

It is worth noting that the parties represented in the interviews carried out for this project did not include an exhaustive list of participating parties in the IA. Therefore, important perspectives regarding the inclusion of shipping and concerns regarding project shipping were lost, as the recruitment of local community members and members of the local HTO for remote interviews was extremely illusive. From the documents consulted for this research, and as described in Chapter 4, it is well documented that local community members, HTOs and KWB participants had significant and wide-ranging concerns about the marine impacts of the Meliadine development which undoubtedly influenced the NIRB's rationale on the project, leading to the emphasis that shipping is an important area for further study and dialogue beyond a single IA (NIRB, 2014a).

It is also worth noting that many of the shortcomings identified in the Meliadine IA, such as the way in which data shortcomings inhibit the ability of IA to make accurate impact predictions or analyze potential impacts from fuel spills in meaningful ways, were also identified in the other IAs studied. Given the broad understanding of these shortcomings in the literature (Section 2.1.3 and 2.2.5), and the way in which they inhibit sound decision making in project IA, this chapter contributes to the need for a regional or strategic IA to consider shipping impacts in Nunavut waters at a broader scale, but also for ongoing science and data collection to be carried out to enable better impact prediction, mitigation, and management, and cumulative effects assessment at the project level.

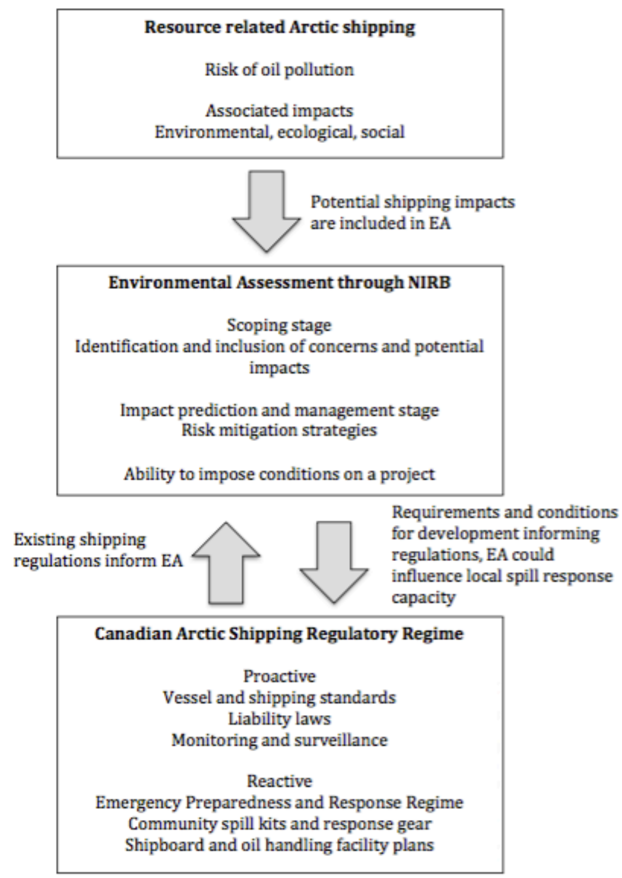
Chapter 6: Project IA and regional shipping governance

6.1 Introduction

In the process of establishing this research project, I generated a conceptual framework that presented possible interactions between the IA process, the impacts of Arctic shipping, and the Arctic shipping regulatory regime (see Section 2.4). In that framework (included here as Figure 6.1), IA was situated as a bridge or link between Arctic shipping risks and impacts at the top of the figure, and the regulatory environment at the bottom.

My research endeavored to understand to what extent IA created a space for deliberation and decision-making regarding the shipping operations of new resource development projects in Nunavut. Specifically, I wanted to understand the potential of project-based IA to identify and address the issues, concerns, and impacts of Arctic shipping. To do so I examined a recently completed NIRB IA (Chapter 4), and by comparing this IA with several secondary cases (Chapter 5) I was able to understand the extent to which IA has been used to identify shipping impacts associated with resource extraction (Figure 6.1, top arrow) and how project specific requirements implemented through IA have been used to influence project shipping activities (bottom arrows). This chapter focuses on the bottom half of Figure 6.1, by describing various avenues through which project-based IA can influence

Figure 6.1: Research Conceptual Framework



project-based shipping and exploring the potential for IA to be a tool for shipping governance in the region.

This chapter is organized into several sections. First, the main avenues through which IA can influence the implementation of project shipping are described. Next, the limitations of IA as a planning tool are described in Section 6.3, and an attempt is made to demonstrate the bounds of project IA's reach in imposing project specific regulations on projects. Section 6.4 explores the potential for IA to play a role in the regional governance of shipping and demonstrates numerous opportunities that arise through IA to further address impacts of Arctic shipping and shortcomings in the scientific and emergency response regime in the region.

6.2 IA and interaction with the Arctic shipping regulatory regime

It is evident from my research that the existing shipping regulatory regime has significant influence over the regulation of project shipping, both while discussing shipping parameters with the IA process, and after project approval. The IMO's international conventions and the existing federal shipping legislation (as described in Section 2.2) form the basis of the shipping safety and spill response requirements for ship operations in Canadian Arctic waters. As depicted by the arrow in the bottom left-hand side of Figure 6.1, the existing federal legislation is the starting point for any discussion on shipping rules and requirements during an IA, and in the early projects, which did not consider shipping impacts in much detail, it was perhaps understood that shipping defaulted to an area of federal jurisdiction.

The ways in which IA and project specific outcomes influence shipping activities (Figure 6.1 – bottom right arrow) is less straightforward. Through my research, I have identified two main types of IA outcomes that influence project-based shipping. First, are the project-based mitigation measures identified or established in the IA process in order avoid or minimize potential shipping related impacts. Second, are the IA outcomes that lead to ongoing dialogue around project shipping. These could be described as IA 'spin-offs', and include initiatives such as discussion forums and consultation meetings designed to continue the regional dialogue around project shipping. Project specific requirements of both types have been imposed on project shipping in the recent IAs studied, building upon the basic set of federal regulations with project specific parameters. These two types of IA outcomes will be described in turn.

6.2.1 Project-based mitigation measures

The most direct way in which IA can influence project shipping activities is through operational mitigation and impact management measures. These measures are largely precautionary mitigation measures that attempt to address potential shipping related impacts by avoiding or minimizing the potential effects. In the Meliadine IA for example, numerous types of mitigation measures were used, including project design features, environmental best practice and operational measures, and management policies and procedures (AEM & Golder Associates Ltd., 2014b).

These measures focus on minimizing potential shipping impacts by using measures such as setback distances and ship routing to avoid impacts in important marine areas, and speed restrictions, navigational best practices, and procedures for wildlife encounters to minimize additional impacts. Further, management policies such as monitoring programs, notification procedures, and commitments to operate only during ice-free conditions or in good visibility are additional measures that reduce the likelihood of impacts (AEM & Golder Associates Ltd., 2014b).

It was generally implied by interview participants that the mitigation measures commonly established to avoid or minimize potential shipping impacts on a project basis are effective. A participant from ECCC suggested that maintaining setback distances from marine bird breading colonies and feeding areas is really important "because it's not just a sensory disturbance issue, [but] if you are staying pretty far back from them you might have a chance to do something if there is a spill before it reaches those areas." The participant from NIRB also suggested that hunting areas and locations of walrus haulouts are really important to local people "so that setback is something they want to make sure is happening…" and similarly, the KIA participant implied confidence in the setback distances adopted to keep ships away from important wildlife areas near Coral Harbour.

Speed restrictions were also understood as an important mitigation measure for numerous reasons. CIRNAC suggested that since charting and navigation are a significant concern in the Arctic as a whole, "any sort of vessel restriction, like speed restrictions are helpful so that you are a little more cautious as you progress." With reference to the Mary River project and the importance of ship based noise in the marine environment, several participants noted that the speed restrictions agreed to by Baffinland (9 knots) would significantly reduce noise pollution (WWF and Academic Participants), and the participant from Coral Harbour suggested that speed restrictions are an important mitigation measures since they help minimize the possibility of ship strikes to marine mammals.

While differences in the application of mitigation measures are found across projects, a basic set of operational mitigation measures, including the ones listed here, have been applied across the projects addressed in this research (see Chapter 5). This finding is also supported by Thiessen et al. (2020), who showed that there is routine application of the shipping mitigation measures outlined here across projects in Nunavut.

In addition to these mitigation measures, the SMPs and EISs established through the IA process routinely include compliance-based mitigation measures already mandated by the existing Arctic shipping regulatory regime. While these measures are often included as project specific measures and it is important to ensure compliance with regulations, they do not extend approval requirements beyond anything that shipping companies would not already be in compliance with.

Compliance based measures commonly inserted into IA documents as safety and mitigation measures include hiring only TC certified shippers, following all best practices around fuel transfer, and using only double-hulled tankers with separate ballast compartments (AEM, 2018a). When considering the project-based spill response infrastructure and capacities established for routine projects such as the Meliadine Mine, the IA process largely defaults to compliance with the OHF regulations as the extent of spill response planning (see Section 4.6.2).

The common use of compliance based measures, which increase the safety of Arctic operations broadly speaking, but are not project-specific or outcomes of IA begin to illustration of the limited reach of IA in Nunavut to impose conditions on project shipping activities that go above and beyond existing regulations. The mitigation measures described above, such as project design features, setback distances, routing measures, speed restrictions, and procedures for interactions with marine mammals, form the extent of IA's influence on project shipping, while more stringent requirements such as mechanical, technological, regional infrastructure requirements for project shipping were generally not included.

6.2.2 Shipping related spin-offs from project IA

Another set of IA outcomes with important shipping related implications are the spaces created through IA for further discussion regarding project-based shipping. These forums offer space for project specific measures addressing potential impacts to be discussed and altered through time, and offer opportunities for consultation and dialogue beyond IA decision-making. Annual shipping consultation tours, shipping related workshops, and marine working groups are examples of these types of IA forums and offer opportunities local community groups to influence the shipping related mitigation measures described in Section 6.2.1. These types of consultation forums have resulted from both recommendations from NIRB and requirements of project approval.

It is evident from my research that these forums have the potential to influence ongoing shipping management policies by altering the operational or mitigation measures employed for project shipping. If carried out well, these forums offer a potential opportunity for local stakeholders to influence project-specific shipping activities and potential influence the governance of resource related shipping in the region more broadly.

6.3 The basis for - and limits to addressing shipping in NIRB IA

As described in the preceding section, project-based IAs in Nunavut can influence shipping for project operations. The extent to which the IA outcomes described above have address shipping impacts in the IAs studied and what curtails the use of further reaching measures is worth a closer examination. In the following section I establish the avenues IA in Nunavut can affect project-based shipping, such as through PC terms and conditions; but also how numerous factors limit the ability of NIRB to impose regulations on project shipping through IA.

6.3.1 NIRB's mandate and authority

The way in which the purpose of project-IA in Nunavut and the NIRB's mandate is understood has important implications for the potential of project IA in Nunavut to influence project-based shipping. The NIRB has a broad mandate to "protect and promote the existing and future well-being of the residents and communities of the Nunavut Settlement Area, and to protect the ecosystemic integrity of the Nunavut Settlement Area [and in the project specific context] to determine if the Project should proceed, and if so, under what terms and conditions" (NIRB, 2014a, p. 9-10). In doing so, the NIRB has an important role to play as a regulatory body, and significant power to impose conditions on the approval of development projects.

Many interview participants pointed to project certificate terms and conditions as the most direct way through which IA in Nunavut has the potential to influence the regulatory environment for project shipping. For example, as offered by interview participants from TC, "NIRB has authority to go above and beyond our regulatory requirements… the terms and conditions can dictate what a proponent is required to do…"

For numerous interview participants, this ability to impose terms and conditions on a project was understood as a strength of IA in Nunavut. The participant from CIRNAC suggested, "now under NuPPAA, the project certificates themselves are enforceable, so they are essentially a regulatory document…" The participant from ECCC indicated the effectiveness of terms and conditions of approval, suggesting the willingness of proponents to share data from monitoring activities is "more of a goodwill arrangement… unless it's written into a project condition or something it's kind of hard to force people to follow that."

PC terms and conditions have played an important role in the establishment of shipping related provisions for each of the development projects studied in my research. For example, in the original Meadowbank PC, the terms and conditions included greatly increased the shipping related requirement of the project (NIRB, 2006). In the Meliadine PC, terms and conditions were included that required additional baseline information and spill modeling exercises that AEM was hesitant to perform during the IA (AEM, 2014b). And across the projects studied, terms and conditions included consultation requirements and measures to include local HTOs in the management plans for project-shipping (NIRB, 2012b, 2014a, 2017a).

Based on comments from participants in the IA process, the NIRB has the mandate and authority to determine what issues and concerns are of critical importance or in need of further attention, and can implement PC terms and conditions to address them (NIRB Participant). The NIRB also has the ability to modify terms and conditions after project approval, which plays an important role in long-term project management and monitoring of project impacts. TC suggested that, "if there is any modification with the project, if there is something new that has come up, I believe NIRB has the power to modify those terms and conditions to reflect the new realities."

Importantly, the purpose of PC terms and conditions was understood by several interview participants as a tool specifically to cover potential gaps in the regulatory regime that may be identified during an IA. The participant from CIRNAC suggested that if a development includes relatively standard operations, then standard ways of addressing potential impacts through licensing and regulatory processes should be applied. The value of terms and conditions then, is to address new challenges or unique aspects of a project being proposed. "Everything isn't covered under licenses or permits… so if there are gaps that you noticed in the regulatory environment – you're not going to fill those gaps by regulatory change necessarily at least not on a project basis - but you can cover those gaps by including terms and conditions in the project certificate" (CIRNAC Participant). This approach to

PC terms and conditions, while serving an important function, also serves to reduce the application of terms and conditions when considering standard or routine operations, such as the shipping components of the AEM mines in the Kivalliq region.

6.3.2 Limits of project-based IA

As mentioned in Section 6.2, the project-based mitigation measures used in IA to address shipping impacts are largely precautionary, relatively limited in scope, and often reiterate industry best practice and operational measures. This research uncovered numerous factors that help explain why the reach of project IA in addressing shipping impacts appears to be limited. These limiting factors largely fall into the following categories: (1) the contextual realities around Arctic shipping, and (2) the perceptions and precedent established within the IA process in Nunavut for addressing project shipping.

6.3.2.1 Contextual limitations

Throughout my research, the environmental and regulatory context of Arctic shipping was mentioned as a factor limiting the application of shipping measures in IA, and creating challenges for decision-making. Many of the interview participants who contributed to this research project spoke about the shortcomings or challenges associated with Arctic shipping that are commonly expressed in the literature. For example, numerous participants documented concerns regarding charting deficiencies and navigational challenges in the Arctic (TC; CIRNAC; ECCC Participants), environmental difficulties for spill response and basic operations in the Arctic (CIRNAC Participant), and the lack of scientific and baseline data for marine environments (NIRB Participant). Numerous concerns were voiced regarding the lacking spill response capacity in communities to mount any type of response and lacking CCG presence to respond to emergencies (ECCC; CH Participants).

A participant from KIA identified a serious gap in the scientific understanding of the Arctic and suggested that lacking baseline data was a primary reason that the analysis of cumulative shipping on marine mammals was inadequate, explaining that basic scientific work in the Arctic is being neglected as federal agencies with the mandate to carry out research often do not have the necessary funding to do so. The participant indicated that, “unfortunately, in the North, research is the last thing and the least for the Federal government.”

Another factor related to these environmental and regional challenges that acts to restrain the potential reach of project IA to address shipping impacts in consequential ways is the legal and technical feasibility of potential terms and conditions (ECCC Participant). There are numerous examples in which more stringent terms and conditions were removed of revised after the fact due to the technical feasibility of the desired conditions.

For example, the original PC for Mary River, Term #173 called on the proponent to employ containment booms during marine fuel transfer activities. In the Amendment 1 of PC No. 005 for the early revenue phase, this term was changed to instead call on the Proponent to “employ best practices and meet all regulatory requirements during all ship-to-shore and other marine-based fuel transfer events” (NIRB, 2014c, p. 211), removing any requirement to carry out precautionary booming. The ECCC participant cited issues with the technical feasibility of precautionary booming as a reason this strategy has not been implemented.

Similarly, interview participants from government agencies had generally positive views about the potential for increased spill response capacity in communities, like the participant from ECCC who suggested that, “it’s absolutely a good idea to have spill response equipment and trained people in each community, if it is feasible,” but cited that that was getting into CCG’s domain.

These shortcomings and challenges regarding Arctic shipping are understood in IA decision-making and many concerns are documented in IA in relation to them. Significantly, these realities curtail the potential of IA to meaningfully identify project-related shipping impacts, and present challenges in mitigation and uncertainty in monitoring after project approval. Thiessen et al. (2020) also describe the potential concern of relying heavily on compliance based mitigation measures in a region that is lacking in the presence and resulting enforcement capacity of federal regulators.

6.3.2.2 Process limitations

In addition to the environmental and regional context around Arctic shipping which create challenges for IA, there are also important process limitations within IA that restrict the potential for IA to influence project shipping with more potency.

One of the basic challenges of addressing shipping impacts within IA is that the project proponents generally contract independent shipping companies to carry out shipping operations. Since the ship operators themselves do not participate in the IA process, distance is created between the proponent participating in the IA and the shipping company overseeing the daily operation of project vessels. As suggested by the CCG1 Participant, how to scope IA to effectively capture impacts of transportation activities of a project has been a topic of discussion since the beginning of IA implementation.

Generally, shipping contractors have been mandated to comply with the project specific SMPs that have been created through the IA process, which outline best practices to follow and the mitigation measures described above (Section 6.2). The level to which Proponents can influence the operations of their shipping contractors has been a topic of disagreement within the IAs I studied. In the Meliadine IA, AEM suggested that the shipping contractor dictates the shipping routes, not AEM (NIRB, 2012a). Alternately, the WWF participant suggested that there is "a lot they can put in those contracts for their shippers - this is what we have been arguing with this project…" and the NIRB participant add that, "even though it is a contractor that is undertaking something, at the end of the day it's still the proponent that is bringing that traffic in for their project."

The evidence from this research suggests that there is a certain level of acceptance that the operation of ships is left to the shipping contractor and is beyond the reach of IA. Regarding the operation of project related vessels for example, TC reiterated on numerous occasions that any conditions, such as routing measures and setback distances established in a SMP are always subject to safe navigation and that overall authority and responsibility for a vessel in maintained by the ship captain. With this reality in mind, and the fact that project ships tracks have deviated significantly from the proposed route (see Section 4.7), it is curious that routing deviations, presumably to be expected, were never addressed in the Meliadine IA by any party.

Further, upon trying to understand the positioning of the proposed route in the IA documents, it became apparent that the route was chosen for the purpose of IA simplicity, while being largely arbitrary in relation to vessel operations in the region. While looking over the boundaries of the Nunavik Marine Region (NMR), I realized that the positioning of the proposed shipping route for the Meliadine project was positioned the way it was only to remain within the waters of the NSA and not enter the NMR. Unfortunately, no representatives from AEM were willing to engage with this research to offer any other explanations regarding the drawing of the proposed shipping route. The fact that ship routing was left to the shipping contractor, and that I found no concerns regarding route deviations from the proposed shipping routes illustrates a certain level of complacency toward shipping impacts for routine resupply ship operations.

A contributing factor to this complacency and one that can act to inhibit further regulation of project shipping in the IA process is simply a lack of consensus among parties about the severity of potential shipping impacts. Differing perspectives on the severity of potential impacts were clearly displayed, both within IA documents and in the interviews I carried out for this research. The dominant perspectives of several important organizations in the IA process regarding shipping are described in the following paragraphs.

In the IAs for routine developments such as the Meliadine project, the potential for substantial shipping related impacts through a large fuel spill event is understood through the lens of risk analysis. As suggested in the FEIS for the Meliadine project, the long-term effects of both small and worst case spills were understood as unlikely and any effects understood as reversible over time. Including that a worst-case spill scenario was "not likely to occur during the lifetime of the Project… [the potential effects were] thus expected to be not significant" (AEM & Golder Associates Ltd., 2014b, p. 22).

The mandate of TC, the most important federal agency when it comes to the regulation of project shipping, is based on ensuring compliance with the applicable shipping regulations for the Arctic. According to a TC interview participant, "if the vessels are meeting our regulatory requirements and following what guidelines and policies we have provided, we don't have any issues. We inspect these vessels, we monitor those vessels, and if we find them not in compliance we take necessary enforcement action, given our mandate."

This also described TC's approach to regional spill response. The OHF regulations prescribe the fuel dispersion and tidal modeling carried out near the location of fuel transfer, the training requirements for employees of the project, and the spill response capacity required (AEM, 2013b). According to representatives of TC, "it is actually quite robust in what they are required to include within our regulations… so that should an actual event occur their planning and preparedness is just that much better when a spill - if a spill was to happen."

Similarly, when addressing spill response requirements within IA, CCG perspective is based on risk tolerance from a national shipping perspective. In response to the requirements for OHF in the Arctic, the interview participant CCG2 suggested that, "being up in the North, yeah I think that is fully adequate and that's where our risk is based around as well. That's what we plan for… under 5000 [litres]." Further the participant suggested that, "we really don't see during transfer - when there is an incident - anything to that magnitude."

My data suggests that the training and preparedness requirements included in the OHF regulations are limited to preparation for spill scenarios during ship to shore fuel transfer and in direct vicinity of the mine's OHF. A KIA representative from Rankin Inlet suggested that due to the presence of the mine near Rankin Inlet, the spill response capacity had "definitely improved the capacity in town," since in addition to the existing spill response planning and capacity in the harbour area of Rankin Inlet, AEM also established a spill response plan and capacity, and extend training exercises to Rankin Inlet's response teams as well.

Contrary to the perspectives of federal regulators, the perspectives of concerned communities, well documented throughout these IAs, emphasize the lacking preparedness and show concerns regarding the affects of increased shipping on the overall health of marine ecosystems. Concerns regarding the potential impacts of fuel spills beyond the immediate vicinity of a mine's OHF were voiced by local participants from the communities along the shipping route in each of the IAs studied in this research.

In the Meliadine IA, the Hamlet of Coral Harbour requested that as part of the mine development, spill response teams should be established in their communities in order to address the lacking spill response capacity along the shipping route (NIRB, 2014b). In an interview with a KIA representative from Coral Harbour the lack of spill response capacity in the community was constantly referred to. This participant noted that training and some level of capacity in communities "is crucial, especially with the possibility of oil spills that might occur south of Coral Harbour." However, this participant explained that at the moment they do not have spill response infrastructure or training in Coral Harbour, and there has "only probably been training where the actual mines are located, such as Rankin Inlet and Baker Lake."

Participants from government agencies generally displayed positive responses regarding increased spill response capacity in communities. For example, the WWF participant suggested that increased capacity is key in order for communities to be involved in spill response. Further, the CIRNAC Participant suggested that it is a reasonable request from communities given that they are closest to the risk and going to have the greatest level of concern. However, based on the interviews carried out with participants from federal agencies, the prevalent understanding regarding the shipping requirements for the AEM mines is that there are regional or national standards that a proponent needs to meet given the scale and nature of their operation. This perspective does not incorporate the requests or desires of other stakeholders active in the IA.

The result is that spill response was largely left to federal requirements. It was however, suggested by the CCG2 Participant that the presence of a mineral development may have an impact on the regional spill response planning carried out by CCG in the future. This participant suggested that the redevelopment of the CCG's dated contingency plans is an important ongoing task and that updating the broader

Arctic regional plan would be followed by "updating our area plans which are very specific and would take into account the actual risk at the mine and [include] a sub-area plan for the mine that would be concurrent with their emergency plans." In this way the presence of a mineral development may result in an increase in spill response planning and response gear in the future through the federal allocation of spill response capacity (CCG2 Participant).

The immense influence over the IA process that regulatory agencies and Proponents have over the IA process as a whole is another way to think about the discrepancies in perspective between stakeholders. According to Morrison-Saunders, Bond, Pope, & Retief (2015), since their actions drive the need for IA and as the main funders of IA, proponents have considerable influence over how IA is conducted, often seen in a push to streamline or simplify the IA process. In terms of the inclusion of shipping in NIRB IAs, my research supports this finding, suggesting that project proponents sought to downplay the severity of shipping impacts, reduce project specific requirements, and argue against the inclusion of shipping in the scope of the project in the first place, and showed hesitancy to developing monitoring plans, potentially suggesting that they believe that monitoring should be role of government.

Another factor that serves to limit the reach of IA in regulating shipping is the inherent focus of project-based IA on a single development proposal. The extent to which an analysis of the existing regulatory regime for Arctic shipping was discussed within the IA process was limited, and in response to any larger regional shipping concerns that surfaced in the IAs studied, interview participants generally pointed to the limitations of project-based IA that have been mentioned in this section. The participant from CIRNAC suggested that IA is not tasked with an examination of the regulatory process, but that it is project specific, "so there may be a need to go above and beyond if there is something unique about a project or if there's particular sensitivities in a community and - and they do right… the intent of IA is to take a look at and see if there's going to be or the potential for significant environmental impacts broadly speaking…"

According to Thiessen et al. (2020), project-based IAs in Nunavut are often forced to contend with bigger questions about regional shipping than might be suitable for a project specific IA. This idea is clearly illustrated in the concerns voiced by local community members in the IAs addressed in this research project. In many cases local community members submitted concerns about regional shipping, tourism vessels, cumulative impacts, and responsibilities of government within a project-based IA (NIRB, 2014a, 2017a).

In this regard, IA in Nunavut is faced with the challenge of if, and to what extent, shortcomings in scientific understanding and infrastructure could be addressed within project-based IA. The interview participants generally suggested that project-based IA is not well suited to tackle regional shortcomings since project proponents should not be held accountable for the larger infrastructure and emergency response shortcomings in the region.

As was evident in the document review of the Meliadine IA, the focus on a single project in IA allowed proponents to effectively argue against project-based measures that would force project shipping to seem to overcompensate for the shortcomings also borne by other types of regional shipping. Several scenarios from the Meliadine IA show that AEM argued against the inclusion of certain requirements, such a requirement for time stamped vessel data, that AEM supplying this information would be "unreasonable" given the scale of project shipping and that ECCC and TC should work together to gathering this information from all ships (AEM, 2013a). Examples such as this one show that project proponents argued against regulations that went above and beyond the existing regulatory requirements for Arctic shipping.

Even so, there are numerous reasons why project proponents may not be well suited to lead the charge in tackling data shortcomings in the scientific understanding of the Arctic marine environment. For one, the CCG1 participant suggested that putting pressure on proponents could help identify gaps, but that proponents should not be held back due to these shortcomings. The CIRNAC and academic participants gave a nod to potential limitations of putting too much onus on project proponents, mentioning that requests of organizations and local communities cannot simply be granted, but that "there has to be some acceptance of cost benefit" (Academic Participant), and while discussing spill response capacity training and gear, the participant from CIRNAC suggested that, "the proponent is the one who has to pay for all this stuff… so there is the time and money associated with [these measures].” Additionally, the KIA participant suggested that more onus should not be on the project proponents to establish baseline data, since communities can be skeptical toward proponents and do not necessarily trust their data.

With the limitations of project-based IA in mind, interview participants pointed to several forums such as regional or strategic IA and the Nunavut land use plan (NLUP) as spaces better suited for the larger regional dialogue around Arctic shipping. When discussing the limits of IA when considering the adequacy of relevant law and regulations, NIRB participant pointed to the differences between project and strategic IA. The participant then reference the Baffin Bay and Davis Strait strategic IA carried out by NIRB as “our best example of an opportunity that the Board was given to help provide feedback in the adequacy of what's going on in the marine environment,” but also suggested that discussing the adequacy of regulations is “a very valid question and one that is discussed… though the transcripts over the years,” potentially suggesting that the existing regulations were never meant to address the increasing levels of shipping seen in the region today.

6.4 Project IA and shipping governance

As has been suggested above, the NIRB has a broad mandate and carries out an important role in resource management in Nunavut. Gondor (2016) refers to NIRB as one of several co-management institutions established through the NLCA to manage Nunavut’s biological and physical resources by fostering cooperation between federal and territorial governments and local Inuit organizations through a multi-level governance framework.

Several authors, such as Dylan (2017) and Barry et al. (2016), place a high degree of importance on the fact that Inuit of Nunavut specifically negotiated for institutions such as the NIRB in the NLCA negotiations to have a space to contribute to resource management planning and decision-making in the future. The extent to which Inuit perspectives and IQ have been incorporated in the process of IA and the decision-making outcomes of IA is a controversial topic in IA literature.

For example, Bernauer (2020a) describes how IA is fundamentally geared toward establishing compromises between industry and local communities. As larger political or management concerns of the Inuit are largely screened out of IA, concessions are offered in return for development, resulting in an IA system of compromise between Inuit and extractive industries which does not challenge underlying power relations between industry, federal government and local communities (Bernauer, 2020b). Dylan (2017) has suggested that in important ways the IA process is skewed in the federal government's favour, while Bernauer (2019) suggests that wealth generated from resource extraction in the Arctic continues to benefit interests outside of Nunavut disproportionately.

Others, such as Peletz, Hanna, & Noble (2020), describe ways in which IA provides an important setting and tool for community consultation about natural resource development and demonstrate how several process requirements included in NIRB IA, such as the importance of the pre-hearing conference, additional checks on proponents, community roundtables and robust monitoring, are specific to Nunavut and provide opportunities for engagement that are specific to IQ.

The high level of collaboration in the Nunavut IA process, as suggested by Peletz et al. (2020), is important since the need for collaborative approaches between proponents, communities and government to address shipping related shortcomings, both within IA and beyond was an important theme that emerged throughout the interviews carried out for this project. For many interview participants, working together was the only way to tackle regional shortcomings in scientific understanding, spill response planning, and lacking enforcement capacity from federal agencies.

The NIRB participant described the entire process of IA and project management as a balancing act. This participant suggested that it remains crucial to emphasize what is important to the Board, but it is also important to work with the proponents and the other agencies to find reasonable solutions to issues or concerns regarding a project: "It's not that you want to catch anybody, but it's making sure that you have enough information available and it is talking to those proponents and making sure that we do have that open dialogue…"

As suggested by Thiessen et al. (2020), for many community members project IA is the only opportunity to participate in a regulatory progress and have their concerns about development in the region heard. This reality emphasizes the importance of IA as a whole and the importance of effective inclusion of the concerns of communities, since if they are not addressed within IA or at least picked up in the process, “a lot of those concerns can be left hanging, left orphaned in a way,” as described the ECCC participant.

Several interview participants also commented on the difficult task of carrying out effective IA. Balancing scientific data, concerns of communities, and holding proponents to sufficient standards is what the NIRB needs to get right in order for IA and project management to move forward effectively. Working alongside communities and proponents and being flexible with requirements is one ways that the NIRB attempts to achieve this balance. When assessing compliance with some of the terms and conditions from Meliadine, NIRB suggested flexibility was important, “we're trying to build in that flexibility so that nothing is… [so prohibitively specific], or that we have to look at that project certificate every time someone wants to change a brand of Kleenex. So it's big balancing act.”

The challenges and realities of vessel operation in the Arctic and the shortcomings in baseline data and scientific understanding of the marine environment are mentioned and recognized within project-IA in Nunavut. With the Meliadine IA as the primary example, recognition of these regional shortcomings is reflected in the NIRB’s decision-making rationale regarding project shipping. The NIRB’s rationale for shipping related decision-making included the following: 1) the NIRB recognized that the marine environment and shipping are of regional concern, and pushed the Proponent to do further baseline analysis and spill modeling and consult with local HTOs; 2) The NIRB acknowledged the scale and nature of project shipping, by emphasizing that the extent of marine shipping is limited to mine resupply during open the water season using established shipping companies and regularly used routes; 3) The NIRB documented concerns with the deficiencies in the available baseline information and the efficacy of proposed monitoring plans to measures cumulative effects; and 4) the NIRB identified shipping as an topic area in need of continued dialogue between parties, future studies, and ongoing work beyond project IA (NIRB, 2014a).

Taken as a whole, this rationale demonstrates the NIRB's approach to project shipping and expresses that the potential impacts of routine shipping operations, such as those required by the AEM mines in the Kivalliq region, are not understood to be significant enough to warrant substantial project-based measures, and indicate that tackling the concerns around cumulative shipping and insufficient baseline data is a topic that is larger in scope than a single project-based IA.

Given the well documented concerns of local communities regarding realized and potential impacts of shipping, this determination from the NIRB calls into question the ability of NIRB IA to adequately incorporate the views of local residents into decision-making. Nevertheless, IA in Nunavut offers opportunities for multiple stakeholders to be involved in the governance around Arctic shipping. The IA "spinoff" outcomes mentioned at the beginning of this chapter are important examples of potential outcomes of project-based IA that extend the reach of shipping related provisions beyond the narrow focus of project IA. In each of the PC studied in this research, NIRB has included terms and conditions outlining continual consultation with local communities and HTOs.

In the Kivalliq region, specific shipping related initiatives carried out by AEM include annual shipping consultation tours which bring AEM employees and representatives from their shipping contractors, Desgagnés Transarctik Inc. and PetroNav, to Chesterfield Inlet and Coral Harbour to meet with Hamlet leadership, HTOs and hold public meetings. The objectives of these meetings are to discuss the upcoming shipping season, and hear feedback and concerns from the communities. These meetings offer an opportunity for community members to document concerns about marine impacts and submit requests regarding ship routing, potential impacts to marine mammals, Inuit marine monitors and spill response considerations (AEM, 2020a).

These meetings naturally remain focused on project-specific shipping, but some discussions documented in the 2019 report include regional concerns of communities. For example, in Chesterfield Inlet a request was made for AEM to support improvements to community docking facilities, while in Coral Harbour concerns were voiced regarding cruise ships and tourism. While these concerns are largely beyond the scope of these meetings, AEM did provide some support for concerns regarding cruise ships by offering to helping facilitate communication with government agencies (AEM, 2020a). These meetings primarily function as opportunities for AEM to disseminate information regarding project shipping operations and monitoring outcomes, but also represent opportunities for community members to interact with AEM and their contractors, which could in turn lead to more informed an effective dialogue in the future.

Spill response training is another area where some collaboration has taken place in recent years. At the Itivia OHF in Rankin Inlet annual spill training involves checking the spill response gear in the sea cans and running through operational procedures. In the 2018 mock spill scenario, as described by AEM (2019b), the Rankin Inlet Fire Marshal and the emergency response team from the mine site were called, and the exercise included deploying marine booms and absorbent materials on the shore. These training exercises are part of the regulatory requirements of the CSA, but extending these exercises to local public works teams and fire departments has lead to some collaboration between communities and project proponents.

In the Mary River case, a Marine Environment Working Group (MEWG – described in Section 5.2.3) was established to offer governmental agencies and local participants a role in the management of shipping for the Mary River project. As described in the final hearing report, the MEWG was established to serve as a forum for discussions regarding shipping impacts and an advisory group regarding the mitigation, monitoring, and adaptive management of project impacts to the marine environment (NIRB, 2012b).

Concerns over the lacking role of the MEWG in Baffinland's marine operations have been well documented, especially by WWF and Oceans North (NIRB, 2018). Reflecting these concerns, the interview participant from WWF suggested that the MEWG held of a lot of promise in the beginning, in that the group would be able to help propose mitigation measures based on the findings from monitoring programs. However, as Baffinland was not required to embrace advice from the MEWG in decision-making, and as Baffinland continually took more control over the group, it was left “quite dysfunctional, because the NIRB often pointed to it as a check, you know a balance on Baffinland's operations, but it wasn't anywhere close to that” (WWF Participant).

In a recent submission on behalf of Clyde River and the Nangmautaq HTA for the Phase 2 IA, Bernauer et al. (2021) suggested that the MEWG and its ability to play an effective role in the adaptive management framework created for the Mary River mine was being curtailed by Baffinland’s control of the MEWG. Suggested recommendations to improve the situation included that it should be facilitated by a third party, such as the NIRB, and that transparency and trust could be built by including more community level participants, by making documents and meeting discussions public, and working with Inuit on establishing thresholds of significance (Bernauer et al., 2021). The WWF participant suggested that if there was an obligation for Baffinland to follow the advice of the group that would completely change the dynamic.

Gondor (2016) indicates that a central purpose of IA in Nunavut is to manage the region’s biological and physical resources by fostering cooperation between federal and territorial governments and local Inuit organizations, and Gulas et al. (2017) suggest that IA has the potential to improve pollution prevention and spill response regimes by creating a space for cooperation between stakeholders around resource development. The experience from Mary River and the MEWG does not necessarily set a helpful precedent when it comes to collaboration and the inclusion of local voices in project management, but this type of MEWG forum could be improved significantly, as suggested by Bernauer et al. (2021). On the other hand, AEM has shown willingness to embrace routing requests that have been voiced by community members form Coral Harbour for years, and now use the route south of Coats Island as their primary shipping route to both the Meliadine and Whale Tail projects (AEM, 2020a). These examples show that spaces for local voices to include the management of project shipping are being created through IA in Nunavut.

6.4.1 IA Opportunities

Although my research has shown that the reach of project based IA into regional concerns regarding shipping is limited, it is worth suggesting that IA does offer opportunities to address shipping related issues and concerns and will continue to play an important role in the implementation of resource related activities in Nunavut by helping design project management strategies that take local concerns and desires into account. The following sections outline five components of NIRB IA that offer opportunities through which IA can play an important role in the management of project shipping.

6.4.1.1 Scoping

From the perspective of my own work, when I started I was interested to see if shipping had been included in the scope of the IAs, because I anticipated that proponents would attempt to focus the IA on the footprint of the mine project. While there is evidence in the Meliadine case that the proponent sought to downplay the severity of potential shipping impacts by arguing that potential impacts would be insignificant (AEM & Golder Associates Ltd., 2014b), and arguing against the inclusion of shipping in the scope of the IA in the first place (AEM, 2011), the NIRB is very inclusive in its scoping for project proposals, as was emphasized by a NIRB interview participant.

As suggested by Sinclair & Doelle (2015), the emphasis on regional interests and concerns is an important characteristic of IA in Nunavut. My research has shown that by including all the communities in the Kivalliq region in an IA such as for the AEM projects, important regional implications entered the IA process. It is evident in IAs for the AEM mines, that a significant portion of the shipping related concerns originated from the input of communities along the shipping route, such as Chesterfield Inlet and Coral Harbour, who experience the impacts of shipping but not necessarily the same benefits of development that communities near the developments such as Rankin Inlet and Baker Lake, do.

The interview participants who contributed to this research suggested with consensus that shipping impacts of a project, even in relatively routine resupply operations, should be considered within project-based IA. While improvements in the inclusion of community voices is a topic that needs further consideration, the broad scoping carried out in NIRB IA bodes well for the continued inclusion of shipping impacts within project IA in Nunavut.

6.4.1.2 IA as an ongoing process

Second, an important finding from this research is that IA in Nunavut does not end with a decision on a proposed project, but is an ongoing and adaptive process. After an IA decision, many aspects of the IA process continue into the regulatory stage and beyond, as suggested by the CIRNAC participant.

There are many examples of the ongoing nature of NIRB reviews, such as NIRB's ability to revisit PCs and modify terms and conditions if project monitoring suggests the needed for changes. Similarly, the NIRB participant commented on the adequacy of the mitigation measures established in the Meliadine IA, saying, "the Board felt that based on the input from the organizations that these would at least help us identify if things needed to change in the future."

The ongoing nature of IA is linked to the monitoring function assigned to the NIRB, another important component of IA in Nunavut. According to Thiessen et al. (2020) and Peletz et al. (2020), when compared with other IA boards, the NIRB plays a unique role in monitoring after project approval. The NIRB interview Participant suggested that "the reason that it was negotiated for NIRB to have that monitoring role… [was to ensure] transparency in the system."

In a majority of the interviews carried out, monitoring of impacts and compliance with project-based terms and commitments was understood as an important mechanism of IA in Nunavut. For example, the CIRNAC participant commented on how the monitoring setup in NIRB IA creates opportunities for dialogue as organizations continue to look at the annual reports and have opportunities to provide feedback, and "if they have specific concerns they can bring them back up through the process again."

The NIRB participant further explained, that "what you'll hear through a lot of our reports is that monitoring is very important to the Board…" since those feedback mechanisms allow information to come back in and help determine whether or not the terms and conditions or measures included met expectations or whether they need to be adjusted. Further it was suggested, “So while we… make the best decisions we can at the time with the information at hand and then have that monitoring piece to help make sure that it works for the proponent and we're getting that information back in” (NIRB Participant). According to Thiessen et al. (2020), the monitoring function allows the IA process to turn from a linear to a cyclical process creating opportunities for adaptive management to play an essential role in managing the uncertainty of Arctic operations.

At a broader level, IA as a process is also continually evolving. As described in Chapter 5, the inclusion and attention to shipping impacts in project IA has changed through time, and accordingly, the requirements imposed on projects have changed, largely in the direction of greater attention to shipping impacts (see Section 5.3.1). According to Morrison-Saunders et al. (2021), IA evolves through time based on ongoing interpretations of its effectiveness and continual re-evaluation of what constitutes best practice in a given subject area, potentially leading to more stringent or better requirements through time. Additionally, as described in Section 5.4.1, the ongoing learning opportunities presented within and across IAs are an opportunity for different stakeholders to renter arenas of resource governance and help the process evolve along the way.

6.4.1.3 IA and flexibility

A third important opportunity presented by IA for shipping management in Nunavut is the flexibility afforded to IA to design and impose terms and conditions on project approvals. This flexibility allows for projects to operate within specific requirements that reflect the regional context and the values of local communities near a project.

This research has shown that IA allows for regional differences, unique geographic or ecological realities, and the needs and desires of local communities to influence project management. While challenges exist for IA to meaningfully include local communities in project management (such as the MEWG), this opportunity exists within IA in Nunavut. AEM's willingness to work with the community of Coral Harbour and adapt their primary shipping route along the desires of the community is an example of this adaptability or flexibility that can be built into IA if there is effective ongoing consultation built into the process.

The academic and WWF participants suggested that a benefit of IA and project specific parameters is that they can be flexible and specific and that the use of regulation would "actually hinder their ability to be nimble and to be responsive to local needs…" (Academic Participant). In this way the IA process and the ongoing project management that is part of the process in Nunavut presents an opportunity to have project-based parameters for shipping that are designed with input from all the parties involved in the process. Further the academic participant suggested that "I do think that a lot of these measures will be effective, but only if they are dynamic, and adaptable, and nature based, and culturally relevant."

6.4.1.4 IA as a forum for working together

Fourth, my research showed that collaboration between government, industry and local communities is crucial in order to tackle the shortcomings and concerns surrounding regional shipping. As demonstrated in this chapter, IA creates an opportunity for collaborative design of shipping measures, and collaboration beyond IA.

IA is the main avenue in Nunavut through which communities have influence over resource development in the region and an important space for collaboration between industry, proponents, communities, and government. The KIA participant pointed out that effective collaboration between government, project proponents and the KIA is ongoing on a project basis and includes monitoring and scientific data collection in relation to aquatic impacts from the Meadowbank project. The participant suggested that advisory groups created through IA are important because they allow for important local influence to enter project management. For example, the participant suggested that KIA as been able to contribute the management plans and mitigation measures established for the Meliadine project, "KIA is a big part of developing those monitoring plans – they [NIRB and proponent] don't do it alone."

Forums for working together and learning between parties are important for continual improvement in IA and for resource governance beyond (Section 5.4.1). Since no party holds the keys to understanding a particular resource management situation alone, various participants must learn from one another in resource management systems (Sánchez & Mitchell, 2017). In this regard, Sinclair et al. (2008) suggest that if public participation is meaningful, IA can be an excellent platform for learning, and can lead to social action and decision-making that can contribute toward a sustainable resource future. Additionally, cooperation between industry, regulatory and communities are necessary for effective operationalization of IA follow-up (Morrison-Saunders et al., 2021).

Several interview participants described collaborative work happening outside of IA, such as CCG2 who described effective spill response forums between industry and government, and ongoing higher level initiatives such as the low impact shipping corridors (Dawson et al., 2020). This collaboration also takes place on a project level within IA, and opportunity exists within IA for this type of collaboration to be improved or continued beyond IA.

If the concerns of communities are meaningfully taken into account IA can offer an important forum for communities to participate in the governance of Arctic shipping. The academic participant suggested that, "I would like to see us being as harmonious as possible working together toward these goals and be adapt and make transformations and transitions." The participant explained that progress toward collaborative work will never be made by only using coercion and regulatory tools, but that "there needs to be this shared approach." The IA process presents an opportunity for different stakeholders to work together at the project level, which could influence regional spill response planning beyond.

6.4.1.5 Continued improvement in the assessment of shipping

Chapter 5 suggested that the inclusion and analysis of shipping has increased throughout the lifetime of the projects analyzed for my research. It is therefore feasible that the consideration of shipping impacts will continue to improve in the future, as federal initiatives, such as the Oceans Protection Plan, bring more investment into the Arctic.

The nature of IA also offers opportunities to push for more stringent shipping related provisions, more detailed monitoring requirements or the inclusion of new technologies or techniques as they are developed. The interview participant from WWF described the approach WWF has taken in the Mary River IA: “we try to influence on Baffinland to go above the regulations. Yes, they could stay at the base regulations, but we are proving that those aren't good enough and if they want to operate they are going to have to go above them…”

The social license to operate is an important aspect of project development in Nunavut. The participant from WWF suggested that companies can do more and go above and beyond if that is what is required of them. Understood in this way, the IA process defines what an adequate social license to operate entails, by setting the bars for what adequate preparation or mitigation of potential impacts might be.

Based on this research and the growing attention to shipping in the region, I expect that shipping will continue to be an important topic of resource development in the region and that the project-based requirements will continue to change. As shown by Jones & Morrison-Saunders (2017), participation in IA can positively influence organizational learning and transformation by guiding internal change for decision-making in numerous ways. Both proponents and decision-makers are likely to increase the consideration of environmental impacts in future projects, with proponents likely to consider environmental impacts sooner, decision-makers likely to require increased standards.

Sánchez & Mitchell (2017) also suggest that societal expectations are increasingly going beyond standard project design and mitigation taking into account the requirements of local communities, and that the measure of successful IA might be changing from a process understood as a pass or fail to one where the bar is progressively being raised in the hopes of delivering sustainable outcomes.

6.5 Summary

This chapter has presented my finding regarding the ways in which the NIRB can influence the regulation of project-based shipping in Nunavut through the IA process. The governance of Arctic shipping is a complicated topic, but interview participants suggested that working together between government, shipping industry actors, project proponent, and local communities is needed and can go a long way to improving the overall efficacy of IA and the Arctic shipping and emergency response regime as a whole.

In response to the regional nature of shipping concerns and shipping impacts, the NIRB has emphasized the need for larger and ongoing dialogue on the subject. In the Final Hearing report for the Meliadine project suggested that, "there is a need for greater dialogue and discussion with Nunavut communities regarding shipping in waters of the NSA, particularly related to community resupply and resource development. Nunavummiut and project proponents would benefit from greater leadership and communication from the government agencies and departments responsible for overseeing the laws and regulations that govern shipping in waters of the NSA, as well as parties responsible for the management and protection of marine wildlife and wildlife habitat" (NIRB, 2014a, p. 150).

The interview participant from CIRNAC explained when making comments like this, the NIRB emphasizes areas in which they feel the dialogue should continue and point to the next steps that are needed. When addressing link between project-based and cumulative IA, Sinclair et al. (2017) suggest policy gaps or area of larger regional concern identified during project-based IA could trigger a SEA or REA to address these concerns. This idea is described as an "off-ramp" built into IA, and while there is no legislative off-ramp established in the Nunavut IA process, regional Arctic shipping is a topic and area of concern that the NIRB has clearly demonstrated in numerous Final Hearing reports is in need of larger attention, more detailed scientific analysis and regional consultation.

My research has shown that some of the concerns and conversations regarding regional shipping that arise in the IAs studied are beyond the scope of project-based

IA, and that help from beyond IA is needed to tackle some of the challenges and shortcomings related to the Arctic marine environment. Numerous excerpts from the Meliadine Final Hearing report suggest that tackling the regional shortcomings regarding shipping and impacts to the marine environment falls to the federal government. For example, NIRB suggested that greater leadership from the government agencies and departments would benefit communities in the excerpt above, and communities have called on TC to take on a greater role in monitoring fuel tankers travelling in the region (NIRB, 2014a).

Interview participants largely pointed toward the need for government to take the lead on the larger issues such as spill response capacity and scientific understanding of the Arctic marine environment, but also indicated that shared approaches and contributions from industry have an important role to play in addressing shortcomings. For example, the Academic Participant explained, "I would love for us to see a robust and consistently funded Arctic science program… aimed at achieving an open data base of benchmarking data and science. I think that the Proponent should be forced to co-fund this mechanism, [but] I do not think that they should be forced to commission their own studies." The participant CCG2 expanded on this idea as follows, "government has got to take the lead, but industry being there… they should go above and beyond and participate - that's my opinion, but everyone has a role to play in that."

Several interview participants shared their experiences working with shipping companies and project Proponents on issues surrounding Arctic shipping. The Academic Participant commented that shipping companies, "hold themselves to a higher standard than the regulatory regime holds them to… the last thing they want it to have a spill, their whole business model is based on safe and sustainable operations." The CCG2 participant explained that "industry actually comes to the table and is genuinely wanting to learn how to come together even though they might… legally have no mandate to do so, they still have an invested stake in participating. I mean the social licensing to operate there is pretty – there is a tenuous grasp on that and so they work really hard in the background."

These viewpoints presented by interview participants demonstrate that Proponents and shipping companies want to be part of the process of finding solutions to the shortcomings and gaps present in the preparedness level for shipping impacts in the Arctic. As an existing forum for resource governance, project IA offers an opportunity for project-shipping to be discussed and addressed on a project basis through broad scoping in NIRB IA, the ongoing nature of IA, the flexibility IA offers for shipping to be regulated within the regional reality of a project, as a forum for working together and through the continued improvement in the assessment of shipping impacts.

According to Greig & Duinker (2011), IA serves an important role in testing scientific understanding and offers a space for knowledge of project impacts to be tested in the field in order to gain insights beyond IA. In this regard, the broad application of impact mitigation measures for shipping impacts across resource projects in the eastern Arctic developed and implemented in IA and monitored post project approval could result in important knowledge of shipping impacts and better understanding of the efficacy of mitigation measures. Over time, the success project-based conditions that have been widely implemented and studied through time may make them great candidates for inclusion in regional regulations.

A similar determination was made by Thiessen et al. (2020), who suggested that the best management practices developed in the IA process for resource development resupply shipping have the potential to inform shipping management practices in other shipping activities such as community resupply and tourism, since many of the potential impacts across the different types of shipping in the region are the same.

Returning to the model depicted in Figure 6.1 at the beginning of this chapter, several findings are worth summarizing. First, it is evident that the existing shipping regulatory regime has broad influence on the process of addressing shipping related impacts within IA. This is illustrated by the inclusion of many project measures focused on compliance with the existing regulations and the tendency in IA to resort back to the existing regulatory regime when project-specific conditions are not accepted as feasible or too ambitious for the project-based setting.

Second, this research demonstrated that IA was able to influence the regulations of project shipping through PC terms and conditions and operational mitigation measures designed in IA. While these are largely limited to simple operation measures, like setback distances, they do hold project shipping to a higher standard than other regional shipping.

Third, this research has shown that other shipping related outcomes, referred to as IA spinoffs, that include consultation and ongoing shipping management forums, add an iterative or adaptive component to the management of project shipping activities, through which the mitigation measures and project-based shipping parameters can be altered, improved, or changed through ongoing monitoring of project impacts. In general the findings confirm the basic linkages depicted in Figure 6.1, while IA “spin-offs” add an iterative component to IA that was not depicted in the figure.

Chapter 7: Conclusions

The volume of shipping in the Arctic has risen sharply in recent years and is expected to continue to increase in the coming decades (Dawson et al., 2018; WWF Canada, 2014). Resource development projects are understood as a leading source of new shipping in the region, with the potential to dramatically increase shipping levels in the future (Kikkert, 2012; Marty et al., 2016).

Given the well documented concerns about shipping impacts in Arctic waters, the shortcomings in regional emergency response capacity, and the likelihood of continued increases in regional shipping due to resource development projects, the purpose of this research project was to investigate the potential of Nunavut's IA framework to meaningfully identify and address concerns and potential impacts associated with project related shipping and the accompanying impacts of spills into the marine environment. My research was guided by the following objectives:

1. To explore a recently completed IA of a project with shipping implications in Nunavut to examine what concerns were raised about shipping, whether and how shipping increases were considered, and what shipping outcomes were established.
2. To establish how the relevant local and regional spill response plans have, will be, or could be modified as a result of IA process outcomes.
3. To understand the extent to which IA has been used to address shipping impacts associated with resource extraction projects in the Arctic context and the interface of IA decisions with the regulatory regime.
4. To develop policy recommendations regarding IA practice relevant to dealing with shipping and spill risks associated with resource projects in Nunavut.

To address these objectives I selected the IA of the Meliadine Gold Mine as the main case study, and explored numerous secondary cases to contextualize the findings within the broader context of shipping and resource development in Nunavut. Data was collected through document review and interviews with experts and representatives of organizations that participated in the IAs. The sections that follow provide my concluding thoughts for each of the objectives of the study.

7.1 The inclusion of shipping in project-based IA in Nunavut

To begin the data collection stage of my research project, I explored the IA of the Meliadine Gold mine to understand the extent to which shipping considerations were included in the IA. I examined the concerns raised about shipping impacts and to what extent potential impacts of increased shipping, such as disturbance to wildlife and the risk of fuel spills, were addressed within IA.

As suggested in the preceding chapters, IA in Nunavut routinely includes shipping activities within the scope of review, identifies basic impacts related to marine shipping, and has established marine VECs for impact analysis both in the marine environment and in relation to traditional practices. These findings are supported by Thiessen et al. (2020), who suggest that over the course of eight IAs in Nunavut between 2006 and 2018, 71 identified biophysical impacts due to shipping impacts were considered routine.

In the IA for the Meliadine project, a significant number of shipping related concerns were raised by local community members. Inuit organizations and community members documented a significant level of concern regarding both experienced impacts due to ongoing shipping in the region and the potential impacts of additional shipping activities. Concerns regarding potential fuel spills from ships and impacts to marine mammals were the most consistently raised concerns.

Notable shipping related concerns were also submitted by ECCC, and KIA. The data uncovered broad criticisms of the way in which ship related impacts were analyzed. Many criticisms were voiced in the relation to the marine baseline data established, the lack of real time and site-specific data used, the limitations in the fuel dispersion modeling exercises carried out, and issues with the significance determinations assigned to potential marine impacts. The combination of these shortcomings also inhibited the ability of cumulative impacts of shipping to be effectively addressed within the Meliadine IA.

In order to avoid and minimize potential impacts of project shipping several project based operational measures were established in the IA, including speed restrictions, routing measures, and setback distances. The mitigation of additional impacts such as pollution and fuel spills response relied on established operational best practice and compliance with the regional shipping regulatory regime.

It should be stated that there is evidence in the Meliadine case that the proponent sought to downplay the severity of potential shipping impacts, by arguing that potential impacts would be insignificant (AEM & Golder Associates Ltd., 2014b) and arguing against the inclusion of shipping in the scope of the IA in the first place (AEM, 2011). The proponent also failed to establish monitoring programs for marine components until required to do so through Project Certificate terms and conditions of approval.

This review demonstrated that the concerns and comments of participating agencies and local organizations are of crucial importance in the IA process in Nunavut, since they helped shape the extent to which shipping impacts were addressed in the IA in tangible ways, like the mitigation measures that resulted. This demonstrates that the IA process is flexible in designing outcomes and developing parameters to address the potential risks of project-based shipping based on the concerns documented through the process.

Finally, in the context of the IA, the Final Hearing report for the Meliadine project described shipping and the marine environment as topic area in need of ongoing dialogue between communities, industry, and government, and suggested that the people of Nunavut would benefit from greater leadership from federal agencies in this regard (NIRB, 2014a).

Through the document review of the main case and comparisons with secondary cases I identified four important trends that help explain the level to which shipping impacts are included in project-based IA in Nunavut. When comparing the IAs of the Meadowbank, Meliadine, Whale Tail and Mary River projects, I quickly established that over the last two decades, the attention paid to shipping considerations within IA had increased dramatically. This trend was illustrated in numerous ways, such as through more detailed scoping activities, more shipping related Project Certificate terms and conditions, and also through a heightened level of concern about shipping impacts from communities, HTOs and governmental agencies alike.

In addition to an increase in the consideration of shipping through time, I identified that the nature and scale of the shipping operation being proposed was an important factor in determining the level to which shipping impacts were addressed in project IA. This was illustrated clearly when comparing the projects in the Kivalliq region with the Mary River iron mine. A related trend suggested that the IA in Nunavut displayed a high level of influence between and building upon previous IA. This is an important finding since it suggests that IA may be able to continually improve the assessment and mitigation of shipping impacts if lessons learned from past experiences and strategies implemented in one IA can effectively be applied to future assessments (Morrison-Saunders et al., 2021; Sánchez & Mitchell, 2017).

According to Sánchez & Mitchell (2017), the quality of IA-related documents appears to have improved over time in many jurisdictions, and potential exists for mutual learning among developers to continue to improve IA performance in the future. The learning evident in my research, and described in Section 5.3.3 is largely single-loop learning, with outcomes that further the understanding of potential shipping impacts and result in changes to project design, implementation and impact management delivered through IA.

A final trend of importance was identified when comparing new developments with amendments to existing projects. Expansions and amendment to existing projects were assessed with less scrutiny and attention to detail than new developments. While this may suggest that increases to existing shipping (through new projects) are taken more seriously than continued existing levels (with extension of mine life amendments), it also supports additional findings from my research that point out weaknesses in the IA process when assessing cumulative impacts or accounting for project impacts in phased approaches.

7.2 IA and project-based spill response capacity

With increased shipping due to resource development projects in close proximity to communities (Dawson et al., 2018), and the prospect of continued increasing levels of shipping in the Canada Arctic (Kikkert, 2012; Marty et al., 2016; Ocean Conservancy, 2017), several authors have demonstrated the critical lack of spill response infrastructure found in the region (DeCola et al., 2017; Molenaar, 2009; Thorsell & Leschine, 2016; Vard Marine, 2015). With this reality in mind, a main objective of this research was to establish to what extent local and regional spill response plans have been, or could be modified as a result of the IA process.

My research has shown that the IA of routine resource extraction projects such as the AEM mines in the Kivalliq region had little influence over the level of emergency and spill response capacity established for a given project. Broadly speaking, the emergency and spill response capacity established at a given project remained a matter of regulatory compliance, focusing on the immediate vicinity of the mine's OHF, as required by the regulations described in the CSA, 2001.

In the IA for Meliadine project, AEM demonstrated the limits of their role in the spill response regime with clarity, suggesting that they carried no legal requirement to establish any spill response capacity beyond the immediate vicinity of their OHF, and that any fuel spill events along the shipping passage fall under the responsibility of the ship (AEM, 2013b).

The OHF regulations stipulate the fuel dispersion and tidal modeling carried out near the location of fuel transfer, the training requirements for employees of the project, and the spill response capacity required at the OHF (AEM, 2013b). As suggested in Section 6.3.2.2 the dominant perspectives of TC and CCG when it comes to spill response are based on risk tolerance from a national perspective and compliance with existing regulations, both of which diminish the need for additional project-based response infrastructure in the region.

Given the training and preparedness requirements of the OHF regulations, a KIA representative from Rankin Inlet suggested that the presence of the mine near Rankin Inlet had increased the spill response capacity in the harbour area of town.

However, the concerns voiced in each of the IAs studied regarding the potential impacts of fuel spills beyond the immediate vicinity of a mine's OHF remained unaddressed in the IAs in the Kivalliq region. In terms of shipping impacts, the communities of Coral Harbour and Chesterfield Inlet continually played important roles in these IAs by expanding the focus to include impacts along the shipping route (NIRB, 2014a, 2017a). In the Meliadine IA, the Hamlet of Coral Harbour requested that as part of the mine development, spill response teams should be established in their communities in order to address the lacking spill response capacity along the shipping route (NIRB, 2014b).

In an interview with a KIA representative from Coral Harbour the lack of spill response capacity in the community was a constant theme. This participant noted that training and some level of capacity in communities "is crucial, especially with the possibility of oil spills that might occur south of Coral Harbour." At the moment however, the participant explained that spill response infrastructure or training had only taken place "where the actual mines are located, such as Rankin Inlet and Baker Lake."

It is worth noting that the Mary River mine, and the exceptional nature of its shipping operation in comparison other mines in the Kivalliq region, did result in mine based spill response capacity that went above and beyond the regulatory requirements (Section 5.3.2). In response to requirements designed in the Mary River IA, Baffinland establishing a Spills at Sea Response Plan which describes the established capacity to carry out basic marine fuel spill response beyond the immediate vicinity of Baffinland's OHF, through the use of line and tug boats situated at the Milne Port site (Baffinland, 2018b).

In relation to the requests of Coral Harbour and Chesterfield Inlet, interview participants from government agencies generally noted positive responses about the potential for increased spill response capacity in communities. As noted in the thesis, WWF suggests that increased capacity is key so that communities can be involved in spill response. Further, CIRNAC suggested that it is a reasonable request from communities given that they are closest to the risk and going to have the greatest level of concern, but cited financial and practical barriers as reasons not to impose conditions such as these on projects such as Meliadine or Meadowbank with limited shipping operations. The additional spill response capacity established for the Mary River mine was likely a result of the scale of the shipping operation and the understood severity of potential impacts. Regardless, the findings from the Mary River case suggest that the potential exists for a higher level of spill response capacity to be established on a project basis through IA.

Beyond examining the establishment of project based spill response capacity in IA, this objective also endeavored to understand potential linkages between IA and regional or local spill response plans. When discussing this potential with CCG participants, it was suggested that the presence of a mineral development may have an impact on the regional spill response planning carried out by CCG in the future. The CCG2 participant suggested that the redevelopment of the CCG's dated contingency plans was an important ongoing task, and that updating the broader Arctic regional plan would be followed by updating local area plans which would take into account the risks of any existing mineral developments. In this way the presence of a mineral development may result in an increase in spill response planning and response gear in the future through the federal allocation of spill response capacity.

When it comes to increased spill response capacity, my research shows that in the case of the AEM mines, project-related spill response capacity and training has been carried out in accordance with the regulatory requirements on the subject, and has not resulted in any improvement in the regional spill response capacity along the shipping route, or even beyond the immediate vicinity of the location of ship to shore fuel transfer through project means. The common precautionary mitigation measures designed and implemented through project-IA such as speed restrictions and setback distances from important ecological areas (Section 6.2.1) perform important preventative functions in reducing the potential impacts of a fuel spill, however these measures do not address the infrastructure and training shortcomings identified in the literature and documented within the IAs studied. The additional spill response capacity established at the Mary River mine suggests that project-based spill response capacity that goes beyond the regulatory requirements can be established through IA, if the risks are understood to be substantial enough to warrant it. Finally, the IA processes studied in the research project did not have any influence over the local or regional spill response plans, though in theory regional response plans would be updated to reflect the increased shipping associated with new resource development projects.

7.3 IA and the regulatory regime

My research suggests that project specific shipping parameters, in the form of impact mitigation measures and operational procedures, were designed during the IA process. The shipping parameters designed and implemented through IA largely revolved around preventative mitigation measures that attempted to avoid potential impacts or reduce the severity of impacts through speed restrictions, routing measures, and setback distances from important ecological or cultural areas. In addition to these project specific measures, many additional measures for shipping activities mentioned and discussed within the IAs studied emphasized the requirements of the shipping regulatory regime in an effort to ensure compliance with the established regulations.

Many interview participants suggested that resource related Arctic shipping should be held to a higher standard than other types of regional shipping such as community resupply. Importantly, within the IA framework in Nunavut, tools exist for IA to impose conditions on project activities, through the implementation of operational mitigation measures and through terms and conditions of approval. As suggested by the interview participant from NIRB, the Board has the authority to determine what issues and concerns related to a project are of critical importance in the region and in need of further attention.

My research showed broad application of PC terms and conditions to impose additional requirements on projects, by reaffirming the requirement for ships to follow operational mitigation measures designed in IA, calling on the proponent to carry out additional data collection and monitoring, and establishing requirements for ongoing consultation with communities regarding shipping and marine management groups that include local stakeholders.

While these project-based measures can be effective and serve to hold project-based shipping to a higher standard than is required in the regional shipping regulations, these project-specific measures were largely limited to simple operational measures, or project design features, and did not include stringent or far-reaching requirements such as limitations on types of fuel use, preventative booming for fuel transfer, or other mechanical, technological, regional infrastructure requirements. The document review carried out for this research uncovered many attempts by Inuit organizations like KIA, and federal agencies such as ECCC, to hold project proponents and their shipping companies to higher standards than were ultimately implemented. On numerous occasions more stringent requests were weakened to resemble industry best practices or argued against by the proponent.

To understand why project-specific parameters were generally limited to simple operation measures and not more stringent or far-reaching conditions my research uncovered a series of factors that limit the reach of project-IA when addressing shipping activities in more consequential ways. My data suggests that some of these factors can be attributed to the shortcomings and gaps associated with the realities of Arctic shipping operations, including the lack of scientific knowledge about the marine environment, gaps in Arctic infrastructure, charting, spill response, and technical issues around requested conditions. These realities of Arctic operations create challenges for IA when it comes to impact prediction and analysis, but also create challenges for IA decision-making when attempting to address these regional shortcomings.

Attempts within IA to address these shortcomings by placing conditions on project shipping, or attempt to scrutinize regional shipping regulations within IA were in most cases deemed to be beyond the scope of project-based IA and were largely met with dismissal within the process. Often this was due to the focus in project-IA on a single development, reducing the assessment of broader concerns, cumulative effects, and larger cultural implications of development. Because of the limitations of project IAs, Thiessen et al. (2020) suggest that project-based IAs in Nunavut are often forced to contend with bigger questions about regional shipping than might be suitable for a project specific IA.

When asked about tackling the regional shortcomings that characterize the scientific understanding of the marine environment and preparedness and response infrastructure in the arctic, interview participants suggested that government needs to take the lead role in tackling broad marine shortcomings in the Arctic, but that collaborative work between stakeholders including communities, industry and government, needs to take place for progress to be made.

As the main avenue through which local participants and communities can influence governance and decision-making around resource projects, IA has an important role to play in resource development in Nunavut. The challenges and realities of vessel operation in the Arctic and the shortcomings in baseline data and scientific understanding of the marine environment are mentioned and recognized within project-IA in Nunavut and acknowledged in the decision making. With the Meliadine IA as the primary example, the NIRB identified shipping as an topic area in need of continued dialogue between parties, future studies, and ongoing work beyond project IA (NIRB, 2014a).

The evidence from my research suggests that IA can create space for ongoing dialogue and consultation surrounding project shipping to continue through the life of resource projects. This is an additional avenue by which IA can continually influence the regulation of project-based shipping. Annual shipping consultation tours carried out by AEM in the Kivalliq region offer an opportunity for community members to document concerns about marine impacts and submit requests regarding ship routing, potential impacts to marine mammals, Inuit marine monitors, and spill response considerations (AEM, 2020a). In the case of vessel routing requests from Coral Harbour, AEM has shown a willingness to accommodate the desires of Coral Harbour, which demonstrate AEM's willingness to work along side communities in the region.

Although my research has shown that the reach of project-based IA into regional concerns regarding shipping, or the application of stringent rules and regulations is limited, the ongoing project-based shipping consultation in the Kivalliq region demonstrates potential for project shipping to be addressed effectively through IA, not just with mitigation measures, but the inclusion of local voices in project management.

My research identified several benefits and opportunities offered by the IA process that suggest that IA can be a tool used to influence project related shipping in the region. IA allows for shipping impacts to be mitigated, and shipping parameters to be established with significantly more flexibility and adaptability than is possible through regulatory avenues. Several interview participants suggested that contrary to regulations at the federal or international level, designing and implementing project-specific parameters through IA enables projects to operate within the specific environmental, social, cultural context and in line with the needs and desires of local communities.

Another important characteristic of NIRB IA is that the development of shipping mitigation measures and conditions does not end when a project is approved. Instead, project management continues as an ongoing process of consultation, monitoring of project impacts and monitoring for compliance with project terms and conditions. As an ongoing process, IA presents opportunities for shipping parameters to be altered and improved, and offers learning opportunities and spaces for local stakeholders to play a role in the management of a project.

The IA process also creates space for collaboration between industry, government and local communities in an established framework. The need for collaborative work on the shortcomings and gaps in the regional understanding of marine impacts and spill response was an important theme that emerged in my research. If the concerns of communities are meaningfully taken into account, IA can offer an important forum for collaborative work between communities, industry and government to take place around planning and designing management strategies at the project level. Through prolonged engagement with IA and ongoing projects, IA also offers an opportunity for collaboration improve and change through time.

Finally, the data suggested that over the course of the last two decades the attention to shipping impacts has increased significantly within project IA in Nunavut. Sánchez & Mitchell (2017) suggest that societal expectations are increasingly going beyond standard project design and mitigation taking into account the requirements of local communities, and that the measure of successful IA might be changing from a process understood as a pass or fail to one where the bar is progressively being raised in the hopes of delivering sustainable outcomes. In this sense the IA process can be described as an exercise in gaining the social license to operate. A participant suggested that companies can do more, and go above and beyond if that is what is required of them. Understood in this way, the IA process can define what the social license to operate can entail, and establish what adequate preparation or mitigation of potential impacts might be.

As has been demonstrated throughout this thesis, IA in Nunavut routinely interacts with the shipping regulation on a project level by addressing potential shipping impacts through project specific mitigation and operation measures, and by ensuring compliance with the existing regulatory regime for Arctic shipping. If continual improvement takes place in the assessment of shipping over time as suggested in Section 5.3.1, and IA can continue to build the role of learning from previous projects as described in Section 5.4.1, then mitigation measures designed within IA and applied broadly among projects in the region, tested through time, could make very good candidates for even wider application in the regional regulatory environment, if changes are desired in the future.

7.4 Policy implications

As suggested by the many participating agencies in the IAs studied and reiterated by multiple interview participants, scientific gaps in environmental understanding and baseline data need to be addressed in order for more realistic and effective impact predictions and analysis to be carried out regarding the impacts of shipping in the Arctic marine environment. While recent initiatives such as the Oceans Protection Plan, Low Impact Shipping Corridors and GENICE project are attempting to address some of these shortcomings, my research suggests that investments in Arctic and marine science are needed to improve the assessment of shipping impacts within IA and beyond.

My research suggests that publically funded science is needed to tackle the data shortcomings in the Arctic marine environment, while also suggesting that collaborative approaches are needed to make realistic improvements in this regard. As suggested by Greig & Duinker (2011), IA has a lot to offer to scientific understanding and improved decision making by continually testing and monitoring impacts and mitigation measures in real life situations. While my research does not suggest that the burden of correcting the weak scientific understanding of the marine environment should fall squarely on the shoulders of industry, the potential for important contributions from project proponents is clear.

There are several recommendations from my research that could expand the role of IA in contributing to regional scientific understanding. First, the data collected by project proponents should be freely shared or made public in an effort to collaboratively address data shortcomings in the region. In the context of IA, the sharing of data could be mandated through PC terms and conditions, or could be mandated in IA legislation. Second, in the context of lacking baseline data, project developments should be compelled to contribute to baseline data improvements through continued data collection and ongoing research as part of their ongoing project monitoring.

By continually collecting physical data in the marine environment and by sharing new data, resource projects could contribute to improvements in the scientific understanding of shipping impacts in the region, which would lead to better assessment in future IAs. Further, as suggested by Sánchez & Mitchell (2017), learning within IA should be treated as a purposeful action and designed as an integral component of IA process. If learning in IA was a purposefully desired outcome from the beginning, better impact predictions, more appropriate mitigation measures and improved decisions could result.

My research also showed how the assessment of cumulative shipping impacts presents a significant challenge for project level IA. As the main process for assessing resource projects in Nunavut, cumulative effects assessment is a critical area in need of improvement in IA. Fostering a more thorough scientific understanding of shipping impacts would improve the assessment of shipping impacts, as suggested above, and would also have important outcomes for the effectiveness of cumulative effects assessment. My research suggests that public research and requirements of projects to carry out more detailed studies and impactful monitoring programs is one avenue through which cumulative effects understanding in the region could be improved. At the same time, project proponents should not be let off the hook because of the existing deficiencies in the scientific understanding of the marine environment. A fitting example from the Mary River case is that the NIRB allowed Baffinland to continue to operate without establishing thresholds and indicators of environmental change, a condition that had been included in the original PC to help assess cumulative impacts of shipping. The suggested improvements in data collection and sharing would contribute to better cumulative effects analysis, but cumulative effects is also an area where project proponents simply need to be held to a higher standard within the IA process.

My research also suggests that there is a need for a regional or strategic impact assessment of shipping in the greater Hudson Bay and Hudson Strait area. A higher-level IA would allow for the assessment of shipping and cumulative impacts of shipping from a broader perspective. A higher level IA approach would also benefit future project assessments and the continued assessment of expansions and amendments to existing projects, another area my research identified as an area of weakness and shortcoming in the assessment of shipping (Section 5.3.4).

In addition to the broad implications described above, my conclusions also lead me to a series of recommendations that would improve the assessment of shipping within IA for routine mineral developments in Nunavut. First, a shortcoming identified in this research was that fuel dispersion modeling in IA was only carried out for marine diesel, the cargo onboard project ships, and did not include modeling or discussion of the potential impacts of heavier fuels used for propulsion of ships. Based on the difficulty of spill response when dealing with heavy fuels, and the emissions that accompany them, including different types of fuel in IA analysis would result in a more accurate understanding of the potential impact of the worst-case scenario of a ship-based spill.

Similarly, ship-based pollution resulting from regular operations remained largely unaddressed in the IAs studied. Lindgren et al. (2016) describe how pollution from ships is not solely the result of large-scale spills, but that ships spill and leak oil as part of regular operations, making some level of pollution from ship activity inevitable. Beyond the mention of chronic ship based pollution from ECCC, described in Section 4.8 above, the majority of concerns and discussions around impacts from hydrocarbon pollution in the IAs I considered were focused on accidental spill events. In the IAs of the AEM mines, any potential impacts due to operational discharges were left to the regulatory regime. Given the wide range of potential pollution from regular operations, it is a significant shortcoming that they remaining unaddressed in the IAs for the AEM developments.

In response to these shortcomings, the WWF interview participant stressed that more could be done to combat operational discharges on a project basis. The participant suggested that reducing or eliminating the reliance of HFOs would be an important preventative mitigation measure, along with addressing the impacts of scrubber affluent. As a first step, pollution from regular operations should be acknowledged in IA and attempts should be made to mitigate potential impacts on a project level.

Second, additional aspects of the analysis of potential shipping impacts are in need of improvement. Based on the finding that ships commonly did not travel within the proposed shipping routes used in the IA analysis, suggests that the proposed routes were not established realistically, and that route deviations common to Arctic shipping were not adequately recognized in the IAs of routine developments. There are straightforward ways of accounting for routine route deviations and the independence of ship operators and their practices that could be implemented in IA. For example, a more realistic proposed shipping route should be used in IA, designed based on previous ship tracks used for community resupply or for existing resupply operations. Additionally, a wider swath along the proposed shipping route should be used as part of the project footprint or RSA. In the Meliadine IA for example, a 10 km swath was established as the marine RSA centered over the proposed route, and this was understood as the area potentially impacted by shipping impacts. Proposing a much wider shipping route and using a larger swath along the proposed route as the RSA would be one way of demonstrating and acknowledging the flexibility with which shipping contractors carry out shipping activities.

Third, this research showed that underlying disagreements between organizations in IA regarding the severity of marine impacts and specifically how significance is defined when addressing potential impacts remain. The shortcomings in marine baseline data, suggested above, and described by Wilkinson et al. (2017) need to be addressed to begin to understand how the marine environment may change due to a proposed activity. My research suggests that addressing these shortcomings lies beyond the reach of project-IA, but remains crucial to improving the IA methods used to predict impacts, determining significance of impacts, establish indicators and thresholds of change when addressing project impacts. This is an area where the inclusion of Inuit communities needs to be carried out effectively, in order for determinations of significance to be agreed upon by the different stakeholders in the region. Improvements required in this regard also extend into the practice of adaptive management with IA in Nunavut, since the NIRB has suggested that adaptive management is central to going forward with development in the face of uncertainty (NIRB, 2012b, 2020b). The application of adaptive management as a strategy going forward cannot be used in place of generating the best possible data within IA.

Finally, in terms of spill response capacity in the region, this research suggests that there is a desire from community members and representatives from federal agencies for basic spill response capacity to be improved in communities along the shipping routes for project resupply activities. As suggested in Section 7.2, project-based parameters that extend spill response gear and training to communities along the shipping route could be imposed through IA just as other shipping related measures have been implemented. While this research suggests that project proponents should not solely be held responsible for regional spill response shortcomings, cooperative approaches undertaken in partnership between the Government of Nunavut, CCG, and project proponents could be developed through project-IA. Additionally, given the identified regional shortcomings in spill response capacity, the approval of new projects in the Arctic with shipping implications should be reflected in regional or local spill response plans. As suggested in Section 7.2, updating local response plan is an ongoing process for the CCG. In this regard a link between IA and local response plans could be established by which any approved project set to increase regional shipping could trigger a review of local spill response plans. In this way shipping risks of new projects would be accounted for in regional planning and beyond the project specific spill response capacity established in the IA process.

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Appendix A: Draft Interview Schedule

Introduction and general questions:

1. [If unclear from the document review] Can you tell me about your role in _________ (organization) in terms of shipping, and/or your involvement in the mine IA?
2. [If unclear] Why did _______ (participant's organization or participant individually) participate in the IA?
3. When you think about shipping activity in the eastern Arctic, how have things changed in recent years?
    a. Do you have concerns about shipping in this area? Why or why not?

Meliadine EA - scoping:

4. What level of concern did you/your organization have about shipping at the beginning of the review?
    a. What were you/your organization's responses to the early shipping concerns of other organizations or actors?
5. AEM's early assertion was that shipping activities fall outside of the project boundaries, and should not be included in the scope of the IA. What did you/your organization make of this early assertion?
6. I noticed a lack of input from local people in the correspondence between parties, or in the scoping workshop meeting for example. Did the concerns documented from the public meetings [such as public scoping meetings in Nov 2011] impact your/your organization's perspectives on shipping, or have any impact on your actions during this phase?
7. The outcome of the scoping stage in terms of shipping was to include all project related shipping within the Nunavut Settlement Area. What was your reaction to the scope of the initial impact statement in this regard?
8. What is the overriding rationale in your mind for shipping to be scoped into the IA for the mine?

[If participant attended the EIS Guidelines workshop (Jan 31- Feb 1, 2012)]:

9. What do you remember about the scoping discussions, in particular the inclusion of marine shipping from this workshop?
10. I see you provided __________ during the workshop. Can you tell me more about this?
11. On several occasions NIRB suggested that "reasonable" outcomes and a "reasonable" level of necessary information had to be agreed upon by the parties. Were the outcomes of the shipping discussion – most notably the

inclusion of the shipping route through the entire NSA area, the assessment of shipping activities and cumulative effects – "reasonable?"

Meliadine IA - Impact Review Period:

12. Thinking about your organization, where did shipping rank among the primary concerns related to this project?
13. In the DEIS, AEM argued that net-shipping increases would be negligible for the project, since the shipping increase due to Meliadine would be offset by the winding down of the Meadowbank mine. Was this in your mind a reasonable assertion?
    a. If yes: is the assertion still valid, given that expansion and further exploration are often objectives of mining operations, as has been the case with Meadowbank?
14. [To ECCC]: In IR 125, the language of "chronic ship-based pollution and cumulative disturbance" is used to describe impacts to migratory birds and habitat. This was the first mention of chronic ship-based pollution. Why is EC at the forefront of inclusion of shipping impacts?
15. [To TC]: Technical Comment 18 encouraged AEM to reference CCG's Regional and National Oil Spill Contingency Plans, why was/is this reference to the regional spill response plans important?
    a. What outcomes did you envision in terms of reference or integration of the different plans?
16. [To GN]: In the technical review period (Nov. 2013) GN for the first time expressed interest/concern about shipping impacts and potential impacts due to fuel spills. Two technical comments (GN14 – polar bear impacts) and GN 15 (oil spill modeling, response capacity, and justification of risk and likelihood – Project Condition 78) became a focus. How did this new emphasis come about?
    a. Is there any reason these concerns did not come about sooner in the process? How did you feel about the response to these concerns?

Meliadine IA - Risk Assessment in the EIS

17. Are you familiar with the spill risk assessment in Appendix E of the SMP? How valuable is this model and its findings, given the degree of uncertainty still present in it?
18. How crucial is spill modeling and shoreline sensitivity mapping when it comes to fuel spill preparedness and response?
19. Why was modeling or consideration for the fuel for the ship itself, e.g. bunker fuel, not included in any of the oil spill modeling?
20. Were you left with any concerns about the approach that AEM took to describe potential hazards and risks associated with shipping?

21. Can you describe what an acceptable or reasonable amount of risk from Arctic shipping would mean for you?

Meliadine IA - mitigation of shipping impacts:

22. Are you confident that the proposed mitigation strategies (reduced vessel speed, navigational aids, setback distances, and giving marine mammals the right of way) will do enough to reduce the impact of shipping on the environment and cultural important marine wildlife?
    a. Are you confident that these mitigation strategies will be enforced? Why, or why not?
23. Do you think the proponent's plan to mitigate shipping impacts adequately address the concerns and potential impacts identified during the EA?
24. What other mitigation measure would you/your organization like to see implemented?
25. Do you think that cumulative impacts and potential future increases were adequately included in the risk assessment and shipping management plan?

Spill Response:

26. Do you think that AEM is prepared to deal with any size of potential spills related to the project, as outlined by project condition 77?
27. When providing spill response scenarios, the OPEP reads that in combination with the OHF gear and SOPEP a spill in the range of 5000 to 10000 litres could be controlled, while anything beyond that would require outside assistance. Do you see this level of capacity (5000 litres) as a concern given the modelling that was done?
28. Do you feel that there is an ability to respond to a small or moderate sized spill outside the harbour area?
29. Project Condition 122 calls for best practices to be used at all times during ship to shore fuel transfer. In the Final Submissions, EC suggested the pre-deployment of booms for all fuel transfer activities at the OHF. What is your view on this requirement and the need to implement it?
30. Are you aware of any consultations that have been carried out between AEM and regulatory bodies regarding the use of dispersants and in-situ burning for fuel spill response?
    a. If yes, have these consultations led to any new outcomes in regards to the use of dispersants and in-situ burning?
    b. What is the current status of the use of dispersants in relation to this project?
    c. If they are not allowed, could exceptions be made for the use of dispersants and in-situ burning for this project?

   d. [To TC]: Is there a change in this policy in the works, or do so you envision a change in this policy in the future?
31. At the PHC (Dec. 2013) Community members showed significant concerns over shipping and fuel spill response. Communities along the shipping route showed interest in having emergency response teams in each affected community before a potential spill. How would you respond to a request such as this one? Is it a good idea? Why, or why not?
    a. How are concerns such as this one being dealt with?

Meliadine IA - monitoring of shipping impacts:

32. Why do you think AEM has had an especially hard time fulfilling Project Condition 82 requiring fulltime marine mammal and seabird observation?
33. Throughout the assessment, beginning in the scoping phase regulatory agencies advocated for the submission of ship tracks and ship logs of all project shipping to be submitted in AEM's annual reports. No ship tracks were included in annual reports until the 2019 annual report (April 2020), why were ship tracks not included ship sooner?
34. [To AEM]: Why were ship tracks not submitted to NIRB as part of the Annual Reports until 2019?
35. The ship tracks submitted to NIRB in AEM's 2019 Annual Report indicate that the ship tracks deviate significantly from the projected track used for the fuel spill modeling. Have you noticed this, and if so, how do you feel they impact the risk assessment and modeling done as part of the assessment?
36. While reading the shipping plans, Annual Monitoring Reports (NIRB) and Annual Reports (AEM) it becomes evident that the MMSO is the only monitoring program for marine shipping – wildlife related, or other. Beyond the MMSO, what other types of monitoring for project-based shipping would you like to see implemented?
    a. What improvements, if any, would you like to see to the monitoring regime for marine shipping? Project based, and regionally.

Meliadine IA - Public Concerns:

37. At every opportunity for public engagement, concerns of local people around shipping impacts were evident. The FEIS determined that the project would not impact traditional resources. Do you agree with this assessment in terms of shipping and shipping risks? If not, why. If so, how so?
38. [To CIRNAC]: The focus of IR 58 and Technical Review comment 170 was about impacts to traditional resources. How satisfied are you with the way AEM has responded to concerns over impacts to traditional resources?
39. Compensation for local hunters is a concern that was continually voiced. The shipping management plan suggests compensation for direct impacts, such as a

vessel hitting a marine mammal, but not for indirect impacts, like the presence of ships altering migration routes or population levels in an area. What approach would you advocate for when it comes to indirect impacts to marine wildlife?

The Meliadine IA - the big picture:

40. Ultimately, do you think the IA as a whole adequately identified issues/concerns around Arctic shipping?
41. Are there important concerns or issues with mine-related shipping that were not raised during the IA? If so, why do you think they were not brought up during the IA process?
42. Did the conditions placed on the project as part of the project certificate go far enough, given the concerns raised during the IA?
43. Did the IA for this project set enough conditions, and are the conditions being met, for you to be confortable with the spill response capacity in Rankin Inlet?
44. How does this IA process and the outcomes with regards to shipping impacts compare with other IA you have worked with or observed in the past?

Meliadine IA and connections to regional shipping impacts:

45. How confident are you in the effectiveness of the regulatory regime for shipping and spill response in the Arctic that the Government of Canada has established?
    a. What are the strengths of the programs?
    b. What are the shortcomings in the programs?
46. Did the mine development have any impact on the regional or local spill response plans?
47. Do you feel like the hamlet/region is better prepared for a potential spill event now that the mine development is here?
48. Throughout the EA there is a call for the project related shipping plans (SMP, OPEP, SOPEPs) to relate to the CCG's Regional and National Response plans, without any details about how this should be done or what outcomes were being sought.
    a. Why is linking the project based spill response plans to regional plans important?
    b. How can/should these plans be related to and inform one another?
    c. Should this be requirement of EA?
49. Should project-based IA be about developing project conditions and mitigation measures that will ensure compliance with the regulations, or should IA include an examination of the adequacy of relevant laws and regulations to protect communities and the environment from project-related harms?

50. If there are outstanding concerns about preparedness and response capacity in the Arctic, where do they get evaluated and addressed?
    a. If not in IA then when/where?
51. NIRB made several comments in their final written statements calling for greater dialogue and discussion with communities regarding shipping related to community resupply and resource development, suggesting that Nunavummiut and project proponents would benefit from greater leadership and communication from the government agencies and departments responsible of the laws and regulations that govern shipping in NSA. To what extent could this dialogue with government agencies and departments regarding shipping (at least project related) take place within project based EA?
    a. If EA is perhaps not the best place to try to deal with the larger regional shipping issues raised here, then where should theses issues be dealt with?
    b. How could they link back to EA?
    c. What could a regional shipping plan/assessment look like?
52. In their Final Written Statements, many agencies and organizations state that project shipping must be considered as incremental, cumulative traffic in a context of great uncertainty and poor understanding with respect to the impacts of shipping on marine mammals and the underwater environment. Has the mine proponent done enough to address the impacts/risks of increased / cumulative shipping?
    a. If no, what do you think should be included in the response plan or improved for you for you feel comfortable with the risks of increased shipping?
53. What could capacity building in the form of equipment, training, and plans, along the shipping route and in the region as a whole look like?

Appendix B: Sample Interview Consent Form

UNIVERSITY OF MANITOBA

Natural Resources Institute
Clayton H. Riddell Faculty of
Environment, Earth, and Resources

303-70 Dysart Road
Winnipeg, Manitoba
Canada R3T 2M6
Telephone: (204) 474-8373
Fax (204) 261-0038

Interview Consent Form

Research Project Title: **The role of project based environmental assessment in considering the impacts of resource development related Arctic shipping**

Principle Researcher: Simon Dueck,
Natural Resources Institute, University of Manitoba.
Phone: - Fax: - ; Email: duecks1@myumanitoba.ca

Research Supervisor: Dr. John Sinclair,
Natural Resources Institute, University of Manitoba.
Phone: - ; Fax: - ; Email: John.Sinclair@umanitoba.ca

This consent form is to let you know what the research is about and what you will be asked to do if you choose to participate. Signing this form, or giving me your verbal consent, is only part of what is called "informed consent." This means that you should always know what the research is about and how I will use the information you give to me. If you want more information about the research, feel free to ask. Please take this time to read this carefully and to understand any accompanying information.

Project Summary: My name is Simon Dueck. I am a Master's student at the University of Manitoba, and I am inviting you to take part in my research. I am researching the role that project based environmental assessment (EA) plays, or that it could play, in addressing shipping impacts related to resource development projects.

Specifically, I want to understand what concerns you have with regard to shipping risks, and whether you think that the potential impacts of mine related shipping were sufficiently included in the EA for the Meliadine mine project. I also want to find out if you think the mitigation and preparedness strategies related to shipping risks that came out of the EA are sufficient.

What I'm Asking You to Do: If you agree to participate in my research I will ask you to meet with me for an interview, or schedule a phone interview if we cannot meet in person. In the interview I will ask you about your involvement in the EA process for the Meliadine Gold Mine. I will also ask you whether or not you think the EA included potential shipping impacts in enough detail, and whether you think the mitigation strategies presented in the EA are sufficient to deal with these impacts.

What I will Do with what I Learn: The information I collect through this research will be used in a University of Manitoba Master's Thesis, which will be made publically available via MSpace. Data from this research will also be used for academic papers, conference presentations, and reports for organizations that deal with shipping and EA.

Risks and Benefits to You: A potential risk to participating in an interview would be if someone knew something you told me and was unhappy about it. I want you to be comfortable during the interview, and so you are free to not answer any questions or discuss things that you do not want to. When I write reports or talk about what I learn from you I will not use your name unless you want me to, instead I will use a general descriptor or pseudonym in its place. I will protect my notes and audio recording of the interview, and will not share them with other participants or other researchers other than my advisor. The risks of participating in this interview are no greater than in everyday life. If a translator is part of the interview, they will sign a form promising to keep what you say confidential. When the research is done I will destroy all recordings and written records of what you tell me in the interview. This will be no later than December 31, 2022.

Your Rights: By signing this form, or giving me your verbal consent, you are saying: *"I have been fully informed of the objectives of the project being conducted. I understand these objectives and consent to being interviewed for the project. I understand that steps will be undertaken to ensure that this interview will remain confidential unless I consent to being identified. I also understand that, I may skip any questions I would rather not talk about, and if I wish to withdraw from the study, I may do so at any time without any negative repercussions. I can withdraw from this research project at any time by contacting the researchers at the phone numbers or emails listed above, at which point any data I have provided will be permanently destroyed, but I understand that this must be before 12/20."*

Signing this form, or giving me your verbal consent, does not take away your legal rights, nor does it release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. Your continued participation should be just as informed as this initial consent, so feel free to ask for clarification or new information at any time. The University of Manitoba may ask to look at my research records to see that my research is being done safely and properly.

This research has been approved by the University of Manitoba Joint-Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the University's Human Ethics Coordinator at 204-474-7122 or humanethics@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

Is it ok to contact you again for more information? Yes____   No____

If yes, how should I contact you (provide your phone, address, or email)?

____

Do you want a copy of the report I will write for organizations dealing with EA?
Yes____ No____
If yes, where should I send it (provide your address or email)?

____

Is it ok with you for me to audio record the interview? Yes____ No____

Do you want me to use your name when I write or talk about what you say?
Yes____ No____

Your Name (Printed) ____

Your Signature ______________________________________   Date _____________

Consent given verbally: Yes □

Researcher's Signature ________________________________Date_____________

Appendix C: Research Ethics Approval and Renewal

University of Manitoba | Research Ethics and Compliance

Human Ethics - Fort Garry
208-194 Dafoe Road
Winnipeg, MB R3T 2N2
T: 204 474 8872
humanethics@umanitoba.ca

PROTOCOL APPROVAL

TO:	**Simon Dueck** Principal Investigator	**(Advisor: John Sinclair)**
FROM:	**Julia Witt, Chair** Joint-Faculty Research Ethics Board (JFREB)	
Re:	**Protocol J2020:021 (HS23805)** **The role of project based environmental assessment in considering the impacts of resource development related Arctic shipping**	

Effective: April 14, 2020 **Expiry: April 14, 2021**

Joint-Faculty Research Ethics Board (JFREB) has reviewed and approved the above research. JFREB is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.*

This approval is subject to the following conditions:

1. Approval is granted for the research and purposes described in the application only.
2. Any modification to the research or research materials must be submitted to JFREB for approval before implementation.
3. Any deviations to the research or adverse events must be submitted to JFREB as soon as possible.
4. This approval is valid for one year only and a Renewal Request must be submitted and approved by the above expiry date.
5. A Study Closure form must be submitted to JFREB when the research is complete or terminated.
6. The University of Manitoba may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

Funded Protocols:
- **Please e-mail a copy of this Approval, identifying the related UM Project Number, to the Research Grants Officer at researchgrants@umanitoba.ca**

A unit of the office of the Vice-President (Research and International) umanitoba.ca/research

University of Manitoba | Research Ethics and Compliance

Human Ethics - Fort Garry
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RENEWAL APPROVAL

Date: **March 30, 2021** **New Expiry: April 14, 2022**

To: **Simon Dueck** **(Advisor: John Sinclair)**
Principal Investigator

From: **Andrea Szwajcer, Chair**
Research Ethics Board 2 (REB 2)

Re: **Protocol # J2020:021 (HS23805)**
The role of project based environmental assessment in considering the impacts of resource development related Arctic shipping

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Research Ethics Board 2 (REB 2) has reviewed and renewed the above research.

REB 2 is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS2 (2018)*.

This approval is subject to the following conditions:

i. Any changes to this research must be approved by the Human Ethics Office (HEO) before implementation.

ii. Any deviations to the research or adverse events must be reported to the HEO immediately.

iii. This renewal is valid for one year only. A Renewal Request Form must be submitted and approved prior to the above expiry date.

iv. A Study Closure Form must be submitted to the HEO when the research is complete prior to the above expiry date, or if the research is terminated.

University of Manitoba | Research Ethics and Compliance

Human Ethics - Fort Garry
208-194 Dafoe Road
Winnipeg, MB R3T 2N2
T: 204 474 8872
humanethics@umanitoba.ca

RENEWAL APPROVAL

Effective: March 23, 2022 New Expiry: April 14, 2023

Principal Investigator:	Simon Dueck
Advisor:	John Sinclair
Protocol Number:	HS23805 (J2020:021)
Protocol Title:	*The role of project based environmental assessment in considering the impacts of resource development related Arctic shipping*

Andrea L Szwajcer, Chair, REB2

Research Ethics Board 2 has reviewed and renewed the above research. The Human Ethics Office is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans-* TCPS 2 (2018).

This approval is subject to the following conditions:

i. Any changes to this research must be approved by the Human Ethics Office before implementation.

ii. Any deviations to the research or adverse events must be reported to the HEO immediately through an REB Event.

iii. This renewal is valid for one year only. A Renewal Request must be submitted and approved prior to the above expiry date.

iv. A Protocol Closure must be submitted to the HEO when the research is complete or if the research is terminated.

Appendix D: Nunavut Research Institute License

Nunavummi Qaujisaqtulirijikkut / Nunavut Research Institute
Box 1720, Iqaluit, NU X0A 0H0 phone:(867) 979-7279 fax: (867) 979-7109 e-mail: mosha.cote@arcticcollege.ca

SCIENTIFIC RESEARCH LICENSE

LICENSE # 03 013 20N-M

ISSUED TO: Simon Dueck
Natural Resources Instiute
University of Manitoba
313-70 Dysart Road
Winnipeg, Manitoba
R3T 2M2 Canada

TEAM MEMBERS: J. Sinclair

AFFILIATION: University of Manitoba

TITLE: The role of project based environmental assessment in considering the impacts of resource development related Arctic shipping

OBJECTIVES OF RESEARCH:
This research project will consider the potential impacts that increases in Arctic shipping may have, and how these impacts have been, or could be addressed through environmental assessment (EA) of resource development projects.The purpose of this research is to explore the potential of Nunavut's EA framework to meaningfully identify and address issues associated with project-related shipping, including the increased risk of spills.

TERMS & CONDITIONS:
The license holder will abide by all special public health protection measures imposed by Nunavut's Chief Medical Officer of Health in response to the Covid-19 Pandemic, including restrictions on non-essential travel to Nunavut. These terms and conditions will form part of this license.

DATA COLLECTION IN NU:
DATES: December 08, 2020-December 31, 2021
LOCATION: Rankin Inlet

Scientific Research License 03 013 20N-M expires on December 31, 2021
Issued at Iqaluit, NU on December 08, 2020

[redacted]
Mary Ellen Thomas
Science Advisor