HUDSON STRAIT SHIPPING STUDY
PHASE 2 – RECOMMENDATIONS

Prepared for:

Andrew Dumbrille
Manager, Oceans and Arctic
WWF Canada
275 Slater Street, Suite 810
Ottawa, Ontario K1P 5H9

Prepared by:

Vard Marine
Suite 1502
85 Albert Street
Ottawa, ON K1P 6A4

Project No: 300
Report No: 300-005-00, Rev 0
Date: 2015-02-23

SUMMARY OF REVISIONS

Report No.: 300-005-00, Rev 0

Title: Hudson Strait Shipping Study Phase 2 – Recommendations

Rev	Date	Description	Prepared by	Checked by:
0	2015-02-23	Preliminary Draft	MT, LM	AK

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND NOMENCLATURE

AIS	Automatic Identification System
CIS	Canadian Ice Service
CCG	Canadian Coast Guard
ESBA	Ecologically and Biologically Significant Areas
HS	Hudson Strait
GEBCO	General Bathymetric Chart of the Oceans
GIS	Geographic Information System
MASIE	Multi Sensor Analysed Sea Ice Extent
NAFO	North Atlantic Fisheries Organization
NOAA	National Oceanic and Atmospheric Administration
SARA	Species At Risk Act
SST	Sea Surface Temperature
TC	Transport Canada
TEK	Traditional Ecological Knowledge

1 INTRODUCTION

This is the fifth of a series of reports that have explored various aspects of the socio-economic, cultural, oceanographic and ecological impact and risk of shipping through the Hudson Strait (HS). This work is on behalf of the World Wildlife Fund (WWF). Funding for the project has been provided by Fednav, Canada's largest ocean-going bulk cargo transportation company, who undertake many operations in the Canadian Arctic.

Hudson Strait is both a destination and a gateway. The level of future shipping traffic and its impacts depend not only on local factors but also on the development of ports, communities, mining, tourism and fisheries throughout Hudson Bay and in the Arctic as a whole. This makes the preservation of the health of the ecosystems particularly challenging, and requires a sharing of responsibilities amongst multiple stakeholders. This project as a whole is intended to provide a compendium of information that can be used to inform and guide a range of future activities relating to sustainable development in and utilizing Hudson Strait.

This report covers the second Phase of the project. It presents recommendations for initiatives in the Hudson Strait, based on the risk assessment and gap analysis performed and data sources catalogued in Tasks 1 to 4 of the first Phase of the project. Specifically, it identifies, provides a rationale for, and details recommendations related directly and indirectly to vessel activities in the Hudson Strait.

The recommendations include a variety of activities, from the collection of better information to fill knowledge gaps to the general adoption of best practices for some types of shipping operation. The recommendations, their source and rationale are described in the remainder of this report.

As with other aspects of the project, the starting point for developing any recommendations is to assume that all operations will be conducted in accordance with applicable Canadian legislation and its associated regulations and standards. While some of the recommendations are intended to reduce the potential for human error, none assume deliberate flouting of requirements.

2 OVERVIEW OF APPROACH

This report collects recommendations related to ship operations in the Hudson Strait. These recommendations have been grouped into 3 broad categories. Specifically:

1. Data collection and processing activities aimed at filling critical knowledge gaps;
2. Targeted risk reduction measures to address certain high risk operations and situations;
3. Measures to apply “best practices” across a wider range of operations in Hudson Strait

The basis for the recommendations is primarily the Risk Assessment and Gap Analysis performed in Tasks 3 and 4 of Phase 1 of the project. These Tasks identified a number of common themes in terms of risks posed to the region due to shipping (and vice versa) as well as areas where there is a lack of knowledge of either the region’s environmental factors or the impacts on them from vessel operations.

in order to allow the recommendations identified in this report to be easily integrated into other business assessment and/or planning activities, each recommendation has been designed to follow the same structure of identification of, rational for, and detailed explanation of the suggested action, as presented in the list below:

I. Recommendation Identification: By item heading, supported by the following text.

II. Recommendation Rationale: The reasons for recommending the given activity are clearly detailed, noting the aspects of the Hudson Strait which make this a priority item, and the nature of the impacts which the measure is intended to address.

III. Detailed Recommendation: The actual recommendation is defined, with an indication of the most logical organization(s) to implement or support the implementation, and an indication of the level of cost involved (drawn from previous elements of the project).

While the recommendations are justified based on the specific conditions in Hudson Strait, many are considered to have broader applicability to other areas of the Arctic and potentially to other “frontier” operations.

Additionally, though the Hudson Strait is well travelled by Canadian Arctic standards, it still has a very low level of shipping activity; and this is confined mainly to the summer (open water) season. As such, it is still an environment in which the influences of shipping have been quite limited in comparison with most other parts of the world, and one which represents a “baseline” condition for future observations of impacts. Some of the recommendations are therefore focused on the opportunity presented by this environment.

3 RECOMMENDATIONS

3.1 MEASURES TO ADDRESS DATA GAPS

3.1.1 General

Task 4 of the project identified a variety of gaps in data and/or understanding of aspects of ship traffic in the Hudson Strait and its impacts, particularly those on local wildlife. A pragmatic approach was taken in assessing the relative priority in filling these gaps. This considered both the criticality of the information to an overall understanding and also the level of effort (cost, time and other factors) that will be required to fill the gap in question.

As noted in Section 2, most of these data gaps are common to all areas of the Canadian Arctic, as well as many other "frontier" areas. While every area will have somewhat different local species and different types of interaction with local communities, similar approaches may be relevant to them.

The gaps with the highest priority for closure from Task 4 included a lack of accuracy for vessel transit records in terms of fidelity and georeferencing, a lack of detailed understanding of the effects of both noise and collisions on cetaceans, as well as a lack of detailed data on the spatial and temporal distribution of cetaceans in the Hudson Strait. Some additional lower priority gaps from Task 4 have also been considered in support of some recommendations.

Based on the above, the recommendations related to closing gaps can be considered in 3 main categories:

I. Vessel traffic and manifest data: Accurate data detailing the spatial and temporal locations of ships within the Hudson Strait, coupled with information on cargo, fuel, and other operational parameters, would have an immense benefit to the quality of any assessments and analyses stemming from this project. The required data is held internally by major operators, and detailed satellite data is available commercially.

II. Vessel noise: The issue of vessel noise is gaining more public visibility. Data gaps exist for both noise generated by ships and the effect of ship generated noise on cetaceans. Data collection efforts which could usefully feed into studies would require only minimal time and equipment and would take place entirely during regular operations. Addressing these gaps would also benefit other studies concerned with regions outside the Hudson Strait.

III. Cetacean interactions: Numerous studies surrounding cetacean behaviour are already in place, and given a sufficiently simple system for logging interactions could easily and effectively be supplemented by real observational data at a minimal cost. Additionally, there is little integration between existing data sets. Integrating new data and existing discrete data sets would also benefit other studies concerned with regions outside the Hudson Strait.

The following sections make recommendations for addressing gaps in each category.

3.1.2 Ship spatial-temporal data fidelity

There is currently only relatively limited data detailing the actual spatial and temporal location of ships performing voyages through the Hudson Strait. The geospatial data used in Task 1 of the project was compiled from NORDREG data and incorporates a number of assumptions and automated processes for the creation vessel voyages.

As a result, currently available data does not account for any deviation in course due to weather, ice, or other logistical factors, and does not provide adequate fidelity for more detailed studies of interaction between ships and the environment of the Hudson Strait. For example, the data resolution available will not allow plotting the exact historical movements of ships in the Hudson Strait in order to overlay them with ranges for habitats and other sensitive areas.

Recommendation G1 is that individual vessel operators be encouraged to share any AIS tracking data they hold for their operations, and additionally, that detailed satellite AIS data be acquired (for cost) for the region from a 3rd party provider such as ExactEarth. Ideally, this should be the responsibility of an appropriate government department or agency, to be made available for future analyses of numerous aspects of shipping operations.

In the current context, better data will allow future studies to more accurately assess when and where vessel traffic intersects with ecological factors, and will significantly improve confidence in risk assessments for ship operator, government, and NGO stakeholders at a modest cost and level of effort.

3.1.3 Ship performance and manifest data availability

Future studies which assess the risk posed to the Hudson Strait (or any other region in the Arctic) by shipping will be greatly improved by an improved understanding of the cargo carried by the ships operating in the region.

Records of cargo carried by vessels are generally not available, which requires Phase 1 of this report, and other studies, to use coarse estimates based on approximate vessel capacities, which are often extremely unreliable. For example, modular cargo being delivered as part of sealift operations is almost impossible to quantify with any level of confidence. When the Sealift was the responsibility of Transport Canada this information was readily available but since its delegation to the territories it has ceased to be collected.

Recommendation G2 is that individual vessel operators be encouraged to share at least a representative general record of the types and quantities of cargo carried into the Hudson Strait. This is particularly important for tanker and sealift operators, whose cargo represents the greatest potential impact to the regional environment should any cargo loss occur.

This recommendation could be supported through federal government programs such as NORDREG requiring more detailed manifests of vessels entering the Arctic. It could also be taken on by provincial and territorial governments who would also benefit from better statistical information on cargoes shipped to their ports and communities. Mandating a reporting requirement would pose very little additional burden on operators, who already have all of the necessary information.

This recommendation will significantly improve confidence in risk assessments for most types of vessels operating in the region, and can be implemented at almost no cost to operators, government, or NGOs beyond management of the additional information.

3.1.4 Research on ship acoustic properties

There is growing interest in a better understanding of noise from vessels, particularly in regions such as the Hudson Strait where cetaceans and other species may be affected. The acoustic properties of vessels operating in the Hudson Strait (and globally, in general) are relatively unknown to the public domain for all types of operations including steaming, manoeuvering, docking, and icebreaking.

Because the traffic levels in the Hudson Strait are currently minimal, seasonal, and predictable, this represents an excellent opportunity to study vessel acoustic properties in a relatively undisturbed environment. Readings will be easier to isolate from the environment, and a significant amount of useful research could be conducted.

Recommendation G3 is that a range of studies of the underwater acoustic properties of vessels be performed in the Hudson Strait, because scientific evaluation of ship noise in a number of contexts will be crucial to any future work as it is significant, and poorly understood.

Implementing this recommendation will certainly incur a certain cost for designing and deploying noise measurement programmes, however the Arctic in general (and the Hudson Strait specifically) presents an excellent opportunity to conduct the research in a mostly untouched environment. Completing studies of vessel noise would offer significant benefits to both the scientific community and their commercial partners.

3.1.5 Research on effects of ship noise on cetaceans

There is limited information on the response to noise from cetacean species available in the public domain. It is however known that low-frequency noise from large ships (20–200 Hz) overlaps the acoustic signals used by whales.

Reported responses of whales to increased noise include: habitat displacement, behavioural changes and alterations in the intensity, frequency and intervals of calls, hearing impairment. However, it is unclear whether exposure to noise results in physiological responses that may lead to significant consequences for individuals or populations, as these reports are limited to local estimates of noise levels and effects on different species of marine mammals (mainly cetaceans - whales, narwhals, and belugas, and pinnipeds - seals and walrus)

Recommendation G4 is that studies be supported assessing the hearing abilities, behaviour and potential impacts of noise on different species of marine mammals in the Hudson Strait, with an emphasis on cetacean species. This type of study, in concert with an improved understanding of the acoustic properties of ships (as in Recommendation 3) will greatly improve confidence in scientific understanding of the effect of noise on marine mammals, and will allow for more meaningful (and therefore useful) risk assessments of marine traffic near areas frequented by such species.

Implementing this recommendation will require a significant level of effort. Due to the potential for its use across a range of impact assessments it should be of interest to a wide range of agencies and other stakeholder groups with interests in conservation issues.

3.1.6 Integration and supplementing of existing studies of cetacean movements and distributions

There are a number of studies of cetacean ranges and movements available in both the public domain, and privately held by government entities, including satellite tagging of individual animals, and areal observations. There is currently however no single, coherent, holistic database of cetacean sightings, which leads to uncertainty regarding the presence of cetaceans in the Hudson Strait at different times of the year.

Due to the importance of the Hudson Strait as a migration passage and as an important living habitat, having as much seasonal data as possible to link with ship traffic would be immensely useful in improving future risk assessments. Assessments currently risk under- or overestimating the impact of ships on cetacean populations due to the seasonality of both cetacean habitats and shipping activity, and uncertainty as to when they are likely to intersect.

Recommendation G5 is that Government and other data holders be encouraged to make their research public, and that all available spatial and temporal data for cetacean activity in the Hudson Strait be integrated into a database, thereby dramatically improving future assessments for the region

This recommendation can be implemented with relatively little cost, and at a reasonable level of effort from each stakeholder. Creation of a single resource for marine species data wold be beneficial to commercial, government, and NGO interests who currently have no such resource on which to base their studies, and additionally would serve as a marketable example of cooperation and unity between concerned regional stakeholders.

Additionally, the remoteness of the Hudson Strait means that most studies are either based on satellite imagery or are opportunistic in nature, such as surveys done as part of environmental assessments of development projects. Targeted studies and observations occur less frequently, however the (potential) frequency at which ships encounter marine mammals presents an opportunity to improve the available data.

Recommendation G6 is that the scientific community, potentially led by WWF, develop a system for recording cetacean sightings and key behavioral traits via a simple, low overhead, low cost method such as a printable form consisting primarily of checkboxes (therefore not requiring crewmembers to spend time writing up additional paperwork) or as a tablet application which could be provided on a loaner hardware device kept near the watchkeeper's station.

With assistance from the scientific community, this recommendation could be implemented with minimal costs. Such a system would not only potentially provide useful and unique data to research efforts, but would also be a highly marketable initiative for operators taking part in the program.

3.2 MEASURES TO ADDRESS HIGHER RISKS

3.2.1 General

Task 3 of the project assessed a range of risks that may be incurred by operations in the Hudson Strait; including both risks to the vessels involved and risks of impacts to the environment. The highest risks identified were specific to certain vessel types and/or to particular types of operations. Figure 3.2 from the Task 3 report is reproduced below.

		Scope of consequences				
		Minimal or none	**Marginal**	**Significant**	**Critical**	**Catastrophic**
Probability of Occurrence	**Near Certainty**		11, **8**			
	Highly Likely		12			
	Likely	9, 13, 19	6, 7	**1, 18**		
	Unlikely		5, 10, 15, 24	2, 3, 17	**20**, 22, **23**	**16**
	Remote		4	21	14	

Figure 3.1: Risk Matrix from Phase 1, Task 3

The recommendations below primarily address the items highlighted by **bolding**.

3.2.2 Capsize Risk Mitigation

Capsize is one of the most dangerous types of marine incident, as it is typically rapid and leads to a very high casualty rate – often all or a majority of those on board. Capsizes are often associated with poor weather conditions, which reduces the probability of survival. Capsize risk is highest for smaller vessels, such as fishing vessels, tugs, and recreational craft. Towing operations can also be hazardous, whether involving "conventional" tug/barge combinations or tows of offshore platforms and other large objects. Most large vessels (cargo and passenger/cruise) are less prone to capsize except as a consequence of earlier damage, though cargo shifting can also lead to higher capsize potential.

In the Hudson Strait, the weather conditions are particularly dangerous for potential capsize. Strong winds are frequent and can arise very quickly. At certain times of year, the combination of wind, below zero air temperatures and cold water can also cause the rapid accumulation of topside icing due to freezing spray. This can increase weight and reduce stability, again particularly for smaller vessels. In the event of an incident, spray accumulation can also prevent the operation of deck equipment, including the launch of lifesaving appliances.

The most effective means of mitigating capsize risk is to avoid the conditions in which it is most likely. In most areas of Canada, this is done by means such as issuing small craft

warnings as part of weather forecasts and as a service available on VHF radio[1], and noting when topside icing may be a hazard. However, this service is not currently available in the Canadian Arctic although "local" weather forecasts may provide some information. Also, outreach programs to fish harvesters south of 60 aim to educate operators in hazards and hazard avoidance; it is unclear whether any similar efforts have been made with local communities in the North.

Recommendation R1: In order to mitigate capsize risk, WWF and other stakeholders should encourage the preparation and dissemination of improved forecasts of hazardous weather conditions by Environment Canada, Transport Canada and CCG. This could be assisted by requiring or encouraging all vessels in Hudson Strait to provide real-time information on local conditions. In addition, means of educating local communities should be considered. At the same time, TC and CCG should consider providing additional information on websites and by other means to assist in voyage planning, particularly for one-off operations such as recreational transits and certain towing operations (see also 3.3.2 below).

3.2.3 Grounding

Grounding incidents can result from poor hydrography and/or human error in coastal waters, and as a consequence of equipment failures such as loss of propulsive power or steering leading to vessels drifting towards the coastline. The consequences of groundings can include high economic costs, release of pollutants if tanks or holds are breached, and possibly the complete loss of the ship.

In the Hudson Strait area the probability of groundings is raised by a number of factors. There is limited charting information, and this is not of high quality. There are few navigation aids and limited monitoring of ship activities. Tidal currents are rapid, and tidal ranges extremely large. Adverse weather conditions and poor visibility increase the challenges of accurate navigation. Ice damage to propellers or rudders can increase the risk of loss of power or steering. If such an incident does occur, the lack of response capability in the area gives a high potential for situations to escalate. There are frequently no vessels in the area which could tow a disabled ship away from danger, as for example has been done in other recent incidents south of 60, such as the CCG's intervention with a container ship off British Columbia[2]. CCG has been reducing its presence in the area in the summer season, and has never operated year round.

Many operators take measures to reduce grounding risk; for example the resupply and cargo operations in Hudson Strait typically use well known routes and cautious operations near shore, including monitoring of echo sounders. In future, the expansion of traffic in general, the use of new routes and new ship types, the extension of operations in swing and winter seasons may tend to increase the probability of incidents. The government's new "Corridors" initiative may have some benefits through concentrating hydrographic and communications resources in priority areas such as the Hudson Strait. The effectiveness of these measures remains to be proven and will be dependent on funding priorities.

---

[1] https://www.tc.gc.ca/eng/marinesafety/tp-tp10038-72-wi-overview-1665.htm
[2] As reported in http://www.cbc.ca/news/canada/british-columbia/simushir-fuel-laden-russian-cargo-ship-under-tow-off-haida-gwaii-1.2803590 and elsewhere.

Recommendation R2 is that WWF and other stakeholders encourage the development of the Corridors initiative and its expansion to consider emergency response capability as an important component of infrastructure. At the same time, TC and CCG should consider providing additional information on websites and by other means to assist in voyage planning and the use of best practices in coastal operations (see also 3.3.2 below).

3.2.4 Cetacean Strikes

Cetacean strikes may take place in many sea areas. In the Hudson Strait, the risk is increased by the relatively large populations which are present at several times of the year. As noted in the risk assessment element of this project, risks may be particularly high in winter, when certain species congregate in the polynyas which are also preferred routes for ships.

At present, there is relatively limited knowledge on most aspects of cetacean populations and behaviours in the Hudson Strait, and several earlier recommendations are aimed at filling knowledge gaps. Meanwhile and in future there are several operational measures which can be recommended to reduce the frequency of cetacean strikes and to mitigate their consequences.

Recommendation R3: In order to reduce the probability of cetacean strikes, it is recommended that all winter operations include instructing lookouts in the need to identify cetaceans and deck officers to adopt appropriate procedures to avoid strikes. When cetaceans are known or anticipated to be present in an area, ships should use reduced speeds to mitigate the consequences of any strikes. Bridge crews should be aware of best practices, such as those contained in "A Mariner's Guide to Whales in the North Atlantic[3]").

This recommendation could be integrated with G5 and G6 above to provide a mutually reinforcing set of measures that would mitigate the impacts of shipping traffic on cetaceans, and potentially on a wider range of wildlife.

[3] ROMM (2014) Available at: http://www.shipfed.ca/new/eng/public/docs/2014-06-27MarinersWhaleGuideEnglish.pdf Last Accessed February 22, 2015

3.3 MEASURES TO PROMOTE BEST PRACTICES

3.3.1 General

Experienced operators in the Hudson Strait have good safety records and very low incidences of environmental incidents, despite the presence of numerous hazards and the difficulty of certain types of operation (e.g. community resupply). This is the result of an accumulation of experience by the personnel involved, the development of operational best practices, and the implementation of a "safety culture" in which lessons are learned and applied after any incident or "near miss".

For new or occasional operators and operations, it is not possible to match the experience levels of the crew immediately, but there is potential for best practices to be disseminated and used in voyage planning and in the actual conduct of operations.

Some operators may be reluctant to share their expertise, as this forms an important element of their competitive advantage for future business. However, all operators in any area should recognize that any incident will impact on everyone's operations.

The recommendations below are, therefore, aimed at measures which can capture and disseminate information on best practices in order to mitigate safety and environmental risks for all future operations. Several are drawn from recent work in support of the development of new IMO Polar Code, which includes a number of recommendatory guidelines in addition to its mandatory requirements. A number of the guidelines relate to operational practices and procedures which supplement current Canadian requirements and whose use should be encouraged. Further, most measures in the Polar Code apply only to SOLAS ships, and exclude fishing vessels, most offshore equipment, and any smaller vessels (<500 GT) which are most at risk for certain types of incident.

3.3.2 Best Practices in Summer/Open Water Operation

Current Canadian requirements and the future Polar Code (scheduled for implementation in 2017) impose relatively few equipment, manning, or operational requirements on ships which are expected to encounter only open water conditions. It is therefore particularly important that such ships are provided with appropriate operational guidance, and that the master and crew read, understand, and apply these materials.

The Polar Code includes a requirement for ships to carry a Polar Waters Operational Manual (PWOM), as a recognition that the existing SOLAS requirements under the International Safety Management (ISM) Code have not been sufficient to ensure that there is appropriate material on board to cover operations in ice. The Polar Code defines the subjects which the PWOM must address, and provides some supplementary guidance on how the contents should be formulated. However, there is considerable discretion for Flag States and their Recognized Organizations (ROs; essentially classification societies) on how this guidance can be interpreted.

There has been some agreement in principle that it would be valuable to develop some "model" PWOMs to cover typical Arctic operations, drawing on the experience of companies with extensive operations to provide information suitable for use by any master and crew undertaking occasional Arctic voyages. A Hudson Strait model PWOM, reflecting the particular conditions in this area would be a very useful document to make available for future voyages.

Recommendation B.1: It is recommended that WWF support and facilitate the development of a "Hudson Strait PWOM", drawing on the resources of its networks in industry, government and the scientific community to assist in this process. A supplement to this would be a software or web-based training program which could be provided to ships to encourage masters and deck officers to familiarize themselves with the materials and to verify that they have done so.

Transport Canada could encourage the use of these materials by ensuring that PWOMs are reviewed (rather than merely being cited) as part of its Port State control inspections for any foreign flag vessels transiting the Hudson Strait and as part of the certification process for Canadian flag SOLAS-certified ships. TC could also be encouraged to extend the requirements for a PWOM to domestic vessels of smaller sizes (as covered by the current ASPPR).

3.3.3 Best Practices for Operations in Ice

Currently, most operations in Hudson Strait are in open water conditions, and this is expected to remain the case in future. However, increasing variability in year-on-year conditions, pressures on infrastructure as communities and economic activity grow, and the requirements of some resource development projects may lead to new operators undertaking voyages in the shoulder and winter seasons when the probability of encountering significant quantities of ice will increase.

This may in turn increase the probability of events such as besetment in ice, or ice damage due to impact loads or pressure during besetment. There is considerable potential for any such incidents to escalate, due to the almost complete lack of emergency response capability in Hudson Strait (and elsewhere in the Canadian Arctic) during the winter months.

Local stakeholders have advocated for additional government provision of support and response services, but this does not seem likely to receive meaningful support from the federal government under near term constraints and policies.

Experienced operators such as Fednav (for current operations) and various oil companies (for planned operations, and to a limited extent for current operations such as seismic surveys) recognize the need to mitigate risk by measures such as:

I. Designing and building vessels with performance margins (e.g. ice strengthening and powering) tailored to the conditions in the Canadian Arctic

II. Developing crew capabilities to operate safely and effectively under the anticipated conditions

III. Providing for their own support, if necessary.

If and when operators plan to undertake new extended season operations, it is highly desirable to ensure that they also adopt these or other effective risk management procedures. **Recommendation B2:** It is recommended that WWF compile a listing of best practices for safe operations in ice, which can be provided to authorities when considering the approval of new operations in and through the Hudson Strait. This can become a baseline for review of applications and assurance that these are undertaken with acceptably low risk.

It is expected that a number of existing operators will support such an initiative, as it lessens their own commercial risk of being undercut by others with lower safety management standards (or less understanding of the risks).

4 SUMMARY

The recommendations include a variety of activities, most of which address the collection of better information to fill knowledge gaps or the general adoption of best practices for some types of shipping operations.

Table 4.1 below provides a summary of these Phase 2 recommendations.

Table 4.1: Summary of Phase 2 Recommendations

No.	Recommendation
G1	Encourage vessel operators to share AIS tracking data, and acquire detailed satellite AIS data for the region from a 3rd party provider.
G2	Encourage vessel operators to share representative records of the types and quantities of cargo carried into the Hudson Strait.
G3	Perform a range of studies of the underwater acoustic properties of vessels in the Hudson Strait.
G4	Provide support to studies assessing the hearing abilities, behaviour and potential impacts of noise on different species of marine mammals in the Hudson Strait, with an emphasis on cetacean species
G5	Encourage government and other data holders to make their research public, while integrating available spatial and temporal data for cetacean activity in the Hudson Strait.
G6	Develop a system for allowing crews to record cetacean sightings and key behavioral traits while at sea.
R1	Encourage the preparation and dissemination of improved forecasts of hazardous weather conditions by Environment Canada, Transport Canada and CCG
R2	Encourage the development of the Corridors initiative and its expansion to consider emergency response capability as an important component of infrastructure. Provide additional information on TC and CCG websites and by other means to assist in voyage planning and the use of best practices in coastal operations.
R3	Instruct lookouts in the need to identify cetaceans and deck officers to adopt appropriate procedures to avoid strikes. Use reduced speeds to mitigate the consequences of any strikes. Bridge crews should be aware of best practices.
B1	Support and facilitate the development of a “Hudson Strait PWOM”, including a supplement of a software or web-based training program which could be provided to ships.
B2	Compile a listing of best practices for safe operations in ice, which can be provided to authorities when considering the approval of new operations in and through the Hudson Strait.

At this time, most of the recommendations represent the beginnings of new initiatives, or improvements to the general understanding of the environment of the Hudson Strait.

However, as research is conducted and new initiatives are adopted these early recommendations should eventually lead to more focused courses of action, such as risk assessments targeted at specific sensitive regions, new practices for operators designed to address specific issues, and research and public education initiatives focused on key habitats and species at risk.