

## EXECUTIVE SUMMARY

### COMMERCIAL MARINE SHIPPING ACCIDENTS: UNDERSTANDING THE RISKS IN CANADA

Workshop Report





**COMMERCIAL MARINE SHIPPING ACCIDENTS: UNDERSTANDING THE RISKS IN CANADA**

Workshop Report

**THE COUNCIL OF CANADIAN ACADEMIES****180 Elgin Street, Suite 1401, Ottawa, ON, Canada K2P 2K3**

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This workshop report was prepared for the Clear Seas Centre for Responsible Marine Shipping (Clear Seas) and results from a two-day expert workshop informed by a survey and a review of the literature. Any opinions, findings, or conclusions expressed in this publication are those of the authors, the workshop Steering Committee, and do not necessarily represent the views of their organizations of affiliation or employment, or the sponsoring organization, Clear Seas.

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## Workshop Participants

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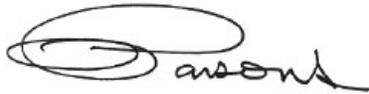
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## Message from the Chair

The Steering Committee wishes to thank the Clear Seas Centre for Responsible Marine Shipping for asking the Council to undertake this workshop. This report would not have been possible without the expertise and engagement of workshop participants, and all those who took the time to give critical input into the report through the peer-review process and the survey. We would also like to thank Erik Lockhart from the Executive Decision Centre at the Queen's School of Business for facilitating the workshop. Finally, the Steering Committee would like to thank the Council's project team for its excellent work throughout this process.



**Captain Dr. James R. Parsons**, Chair

Workshop Steering Committee on the Risks of Marine Shipping in Canadian Waters

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## Report Review

This report was reviewed in draft form by the five individuals listed below — a group of reviewers selected by the Council of Canadian Academies for their diverse perspectives, areas of expertise, and broad representation of academic, industrial, policy, and non-governmental organizations.

The reviewers assessed the objectivity and quality of the report. Their submissions — which will remain confidential — were considered in full by the Steering Committee, and many of their suggestions were incorporated into the report. They were not asked to endorse the conclusions, nor did they see the final draft of the report before its release. Responsibility for the final content of this report rests entirely with the Steering Committee and the Council.

The Council wishes to thank the following individuals for their review of this report:

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## Executive Summary

Over the past few decades, commercial marine shipping has benefited from a number of developments ranging from improved traffic control technology and better ship designs, to a strengthened regulatory regime and enhanced industry safety procedures. These and other changes have all helped contribute to a notable drop in marine shipping accidents, ship losses, and marine oil spills. Though efforts continue to further improve marine safety, public scrutiny of shipping has been heightened in recent years. The risks associated with opening the Arctic to greater ship traffic, increasing marine shipments of oil from Canada's oil sands, and the growth in vessel size, especially of container ships, have all contributed to this awareness.

Amidst these developments, this study seeks to contribute to a national dialogue about acceptable levels of risk. It identifies the risks of commercial marine shipping accidents across Canada's regions and for different cargo types, while highlighting gaps in understanding and areas for further research. To this end, *risk* is characterized in terms of two central elements: the likelihood that accidents will occur, and the magnitude and severity of resulting impacts. The study was commissioned by the Clear Seas Centre for Responsible Marine Shipping and is the outcome of a workshop process and survey that sought input and consensus from a diverse group of experts from across Canada with backgrounds in academia, industry, and government.

### LIKELIHOOD AND IMPACT OF COMMERCIAL MARINE SHIPPING ACCIDENTS IN CANADA

This study makes clear that Canada's waters as a whole have been getting safer over the past decade, with fewer commercial marine shipping accidents. Accidents nonetheless do occur yet typically do not result in large impacts. Indeed, for a commercial shipping accident to occur and result in an impact of significance, multiple factors (e.g., weather, type of cargo, vessel age, timing of accident) must coalesce against a backdrop of a large body of regulations, safety protocols, and practices in place, which serve to mitigate risks. An accident such as a grounding or collision may damage the vessel, but not necessarily lead to any wider negative social, economic, health, or environmental effects. Further, the statistics show that most marine accidents occur in confined waters (harbours, rivers, canals) where response regimes are in place to react quickly.

With few accidents in Canada, much of the evidence on the environmental, economic, social, and health impacts of marine shipping accidents comes from elsewhere. This evidence underscores the fact that large oil spills, because of the severity of their impact, present a significant risk to Canada. Environmental impacts, both immediate and longer term, can lead to a number of subsequent social, economic, and health impacts that increase the overall degree of risk associated with oil spills. The evidence also makes clear, however, that shipment of certain hazardous and noxious substances (HNS) such as pesticides may pose as significant a risk (if not greater) as oil — not least because of Canada's underdeveloped HNS spill response system, as noted by Transport Canada's Tanker Safety Expert Panel in 2014. In the absence of further research on how substances classified as HNS behave in a marine environment, as well as public data on the frequency of HNS shipments, it is difficult to further qualify this risk.

### REGIONAL VARIATIONS IN RISKS OF ACCIDENTS

Different regions face very different risk profiles owing to variances in main types of cargo, risk prevention policies such as moratoriums or pilotage zones, and waterway characteristics, including the degree of ecological sensitivity or the number of constrained waterways. Local economic, social, and cultural contexts further contribute to the diverse risk profiles across regions.

Although **British Columbia** (Pacific region) experiences the highest level of shipping activity, the accident rate and the nature of the cargo shipped, together with current and planned moratoriums, suggest it has a relatively low risk profile compared to other regions. Sensitive marine ecology and geography, a tourism industry heavily tied to marine resources, and the potential impacts on First Nations coastal communities, however, elevate the possible consequences of any accident. Tanker shipments of oil and petroleum products could increase with proposed pipeline projects, which would in turn increase the risk profile of the region.

The risk profile of the **St. Lawrence River** and the **Great Lakes** (Central region) is quite different. The St. Lawrence River experiences the highest level of commercial marine incidents and accidents in Canada and the second highest accident rate, after Northern Canada. However, accidents in this region are the least likely to lead to fatalities or serious injuries, potentially because many are minor events such as strikings along canals, where ships are moving at lower speeds. The proximity of major shipping routes to densely populated cities, the potential economic disruption, and the fact that the St. Lawrence River and Great Lakes provide drinking water for millions would add to the impact should a major accident occur. Increased shipment of crude and petroleum products would in turn increase the risk profile in the region.

The **Maritimes** and **Newfoundland and Labrador** (Atlantic region) as a whole ship more crude oil than any other region in Canada. Though harsh weather conditions and the presence of ice increase the likelihood of an accident in this region, accident rates are relatively low. Nonetheless, the reliance on fisheries (including aquaculture) and tourism, would heighten the social and economic impacts of a significant accident.

In **Northern Canada** where traffic levels are currently low, the factors that can potentially lead to a shipping accident are several and include inadequacy of navigation aids and port infrastructure, ice, and harsh weather conditions. This likely explains why the Arctic experiences a disproportionate number of accidents. There is wide consensus on the sensitivity of the environment and the potential seriousness of impact should a pollution event occur. Furthermore, the Arctic's remoteness can compromise response efforts, and with the absence of a dedicated spill response organization, the potential for impact is elevated.

## RESEARCH AND DATA GAPS

Current gaps in data and research limit the degree to which Canada's commercial marine shipping risks can be fully understood and measured. For risks to be better characterized by stage of shipping or by cargo type, data are needed on the causes, the stages at which incidents or accidents occur, and the frequency of shipments by cargo type and region. This latter data on commercial marine traffic are now much more difficult to acquire since Statistics Canada terminated its publication of marine shipping statistics after releasing 2011 data. Publicly available Canadian statistics on spills, in particular, are found wanting, lacking in the completeness and consistency necessary to understand the breadth of pollution events across Canadian waters.

As for impacts associated with commercial marine shipping accidents, more research is needed on the environmental impacts of HNS, diluted bitumen, and spills in freshwater and cold environments. This research will allow for a better understanding of the extent of their impacts, which in turn can provide a better account of their risk and help improve preparedness and response.

There are also gaps in the understanding of social, economic, and health risks directly associated with major accidents, such as potential disruptions to industry supply chains. More insight into these impacts will come with the completion of the Council's expert panel assessment on the social and economic value of commercial marine shipping in Canada, also commissioned by the Clear Seas Centre for Responsible Marine Shipping and due for release in 2017.