



## UNDERSTANDING SHIPPING RISK IN THE SALISH SEA

[clearseas.org](http://clearseas.org)

# Project Context & Overview

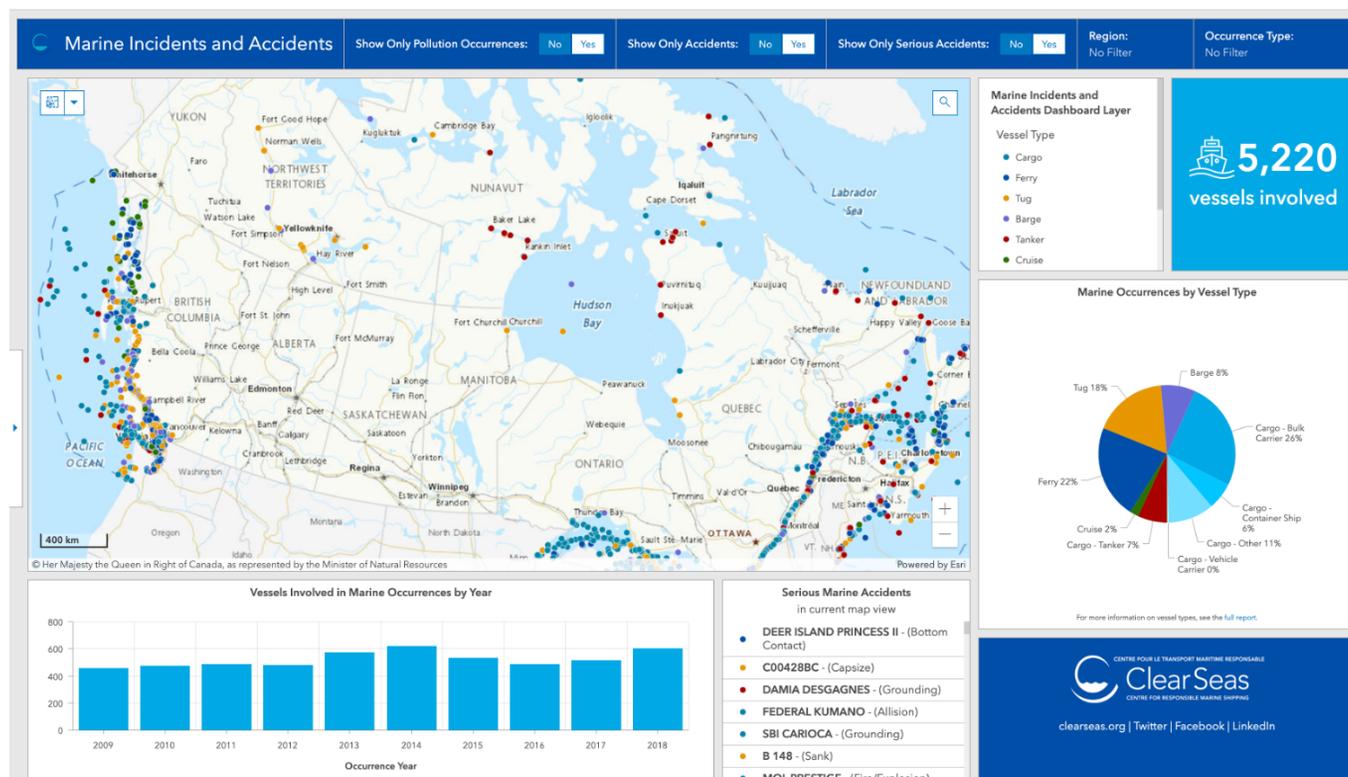


# MAPPING MARINE INCIDENTS & ACCIDENTS

## Maritime Commercial Incidents & Accidents Report and Dashboard (July 2021)

Project aims to:

- Make data more accessible
- Integrate publicly available Canadian and U.S. data sources
- Leverage spatial dataset



# CREATING THE DASHBOARD DATASET

- Defined incidents, accidents, and serious marine accidents
- Filtered extracts from both data sources to fit the project scope
- Data alignment for vessel types and marine occurrence types
  - Challenge: Different terminology is used by different organizations
- Manual data cleaning
  - Challenge: Marine occurrence data not always complete and accurate

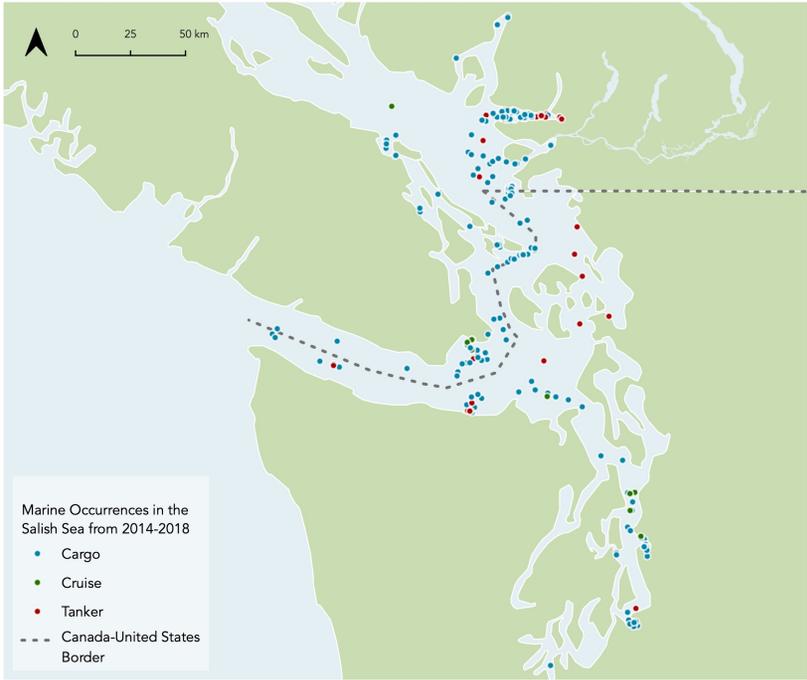
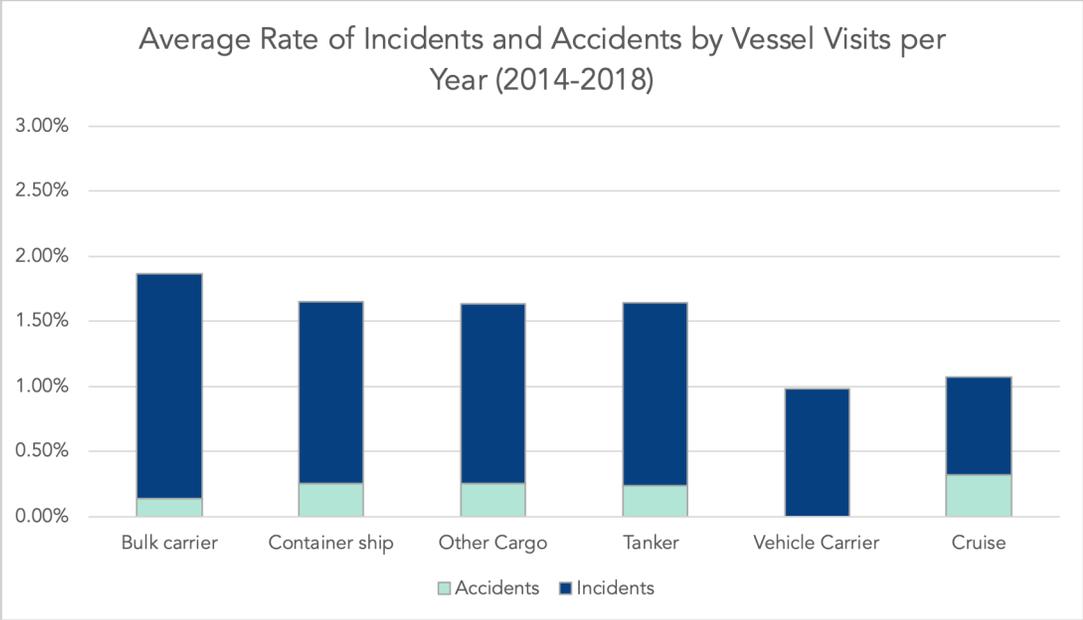
Rank	Clear Seas Incident or Accident	Clear Seas Occurrence Categories	TSBC Occurrence Categories	USCG Occurrence Categories
1	Accident	Sank	Sank	Sinking
2	Accident	Capsize	Capsizes	Capsize
3	Accident	Explosion/fire	Explosion Fire	Explosion Fire – initial
4	Accident	Collision	Collision	Collision
5	Accident	Grounding	Grounding	Grounding
6	Accident	Allision	Striking	Allision
7	Incident	Flood	–	Flooding – initial Flooding – progressive
8	Incident	Sustains damage render unseaworthy /unfit for purpose	Sustains damage render unseaworthy/unfit for purpose	–
9	Incident	Total failure of any system	Total failure of any machinery or technical system	Loss of electrical power Loss/reduction of vessel propulsion/steering Material failure/malfunction
10	Incident	Cargo shift/damage/loss	Cargo shift/cargo loss	Cargo/fuel transfer/shift Damage to cargo Loss of stability
11	Incident	Fouling	Fouls underwater object	Fouling
12	Incident	Risk of incident (e.g., capsizing, collision, grounding, sinking, striking)	Risk of capsizing Risk of collision (near collision) Risk of grounding Risk of sinking Risk of striking (near allision)	Set adrift Vessel yawl/pitch/roll/heel Wave(s) strikes/impacts
13	Incident	Bottom contact	Bottom contact	–
14	Incident	Other	Dangerous goods released Intentional beaching /grounding/anchoring to avoid occurrence	Discharge/release – pollution Vessel maneuver Abandonment

# SALISH SEA OCCURRENCE RATES

## (Version 1: Vessel Visits)

Applying results from Clear Seas' Vessel Traffic Analysis

- Study area: Salish Sea
- Time frame: 2014-2018
- Vessel types: International vessels calling on Canadian or U.S. ports (bulk carriers, tankers, container ships, vehicle carriers, other cargo ships and cruise ships)

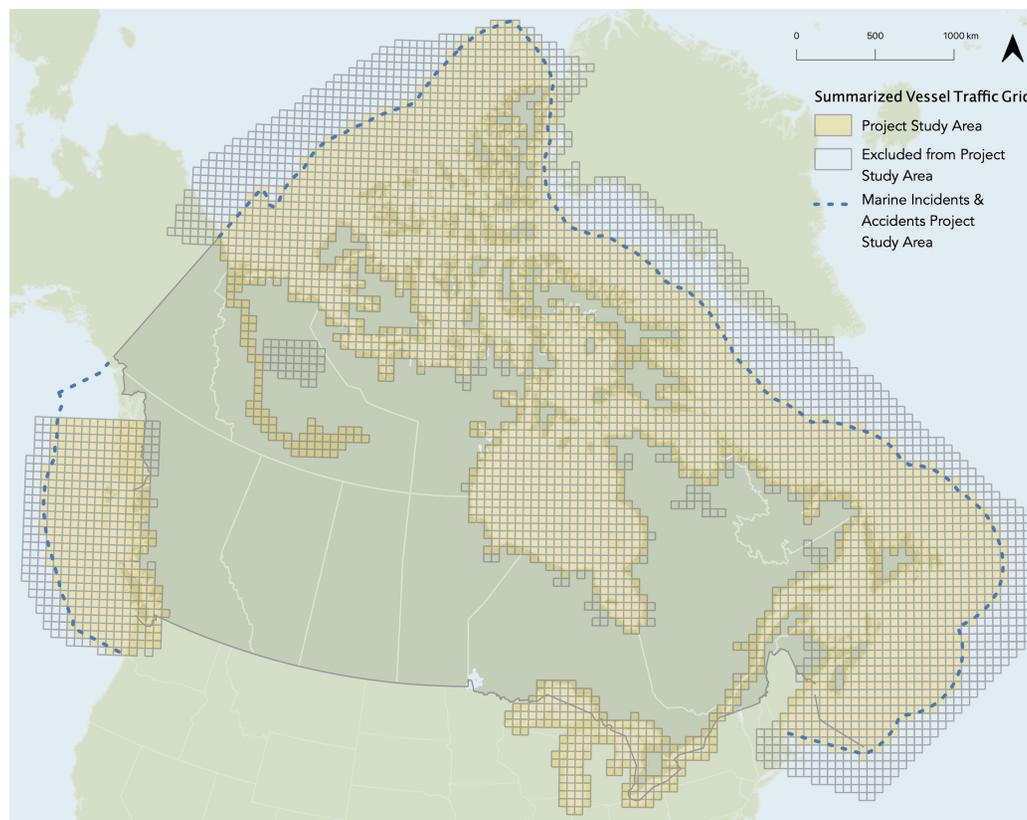


# ASSESSING SHIPPING RISK TO CANADA

## Analysis

Add traffic context to the number of marine incidents and accidents occurring in different regions of Canada with different vessel types

- Provide greater clarity into the risks of shipping across Canada
- Based on AIS data (2015-2018) summarized by Transport Canada and Clear Seas marine incidents and accidents dataset (2015-2018)



# SALISH SEA ANALYSIS: PROJECT SCOPE

## Study area

- Grid cells from the summarized AIS vessel traffic dataset within the Salish Sea, some interior waterways

## Time frame

- 2015-2018: overlap of marine occurrence and vessel traffic datasets

## Vessel types

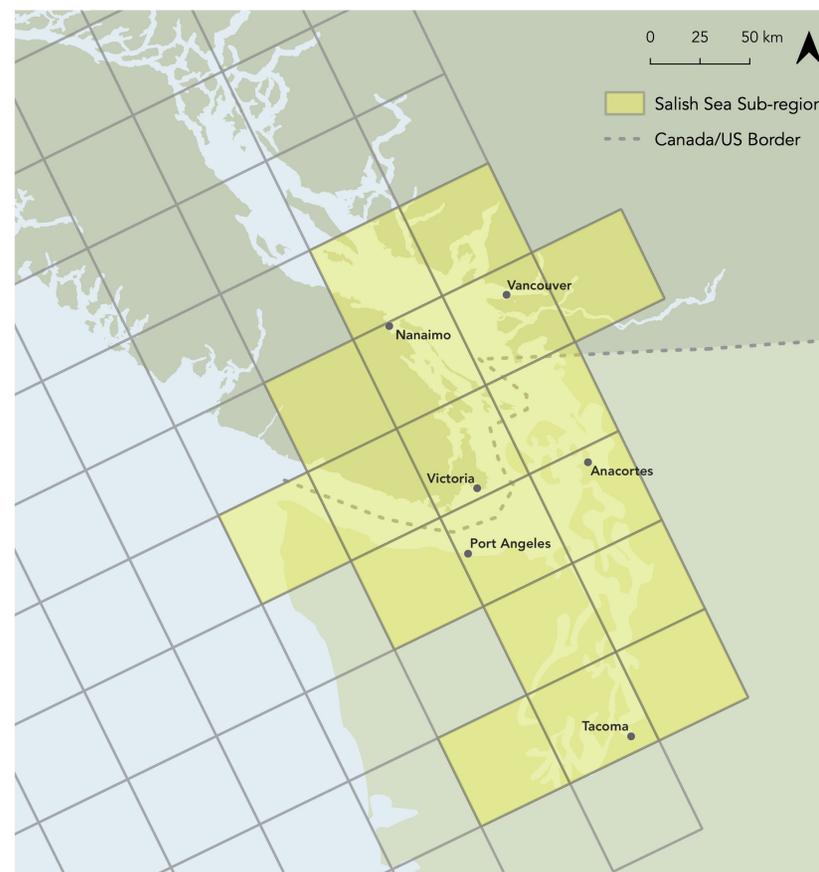
- Commercial shipping vessels, ferries, cruise ships, tugs

## Occurrence types

- All events except crew-related accidents onboard vessels

## Data sources

- Marine Incidents & Accidents Dashboard dataset
- AIS vessel traffic data summarized by Transport Canada – number of nautical miles sailed per vessel type per grid square



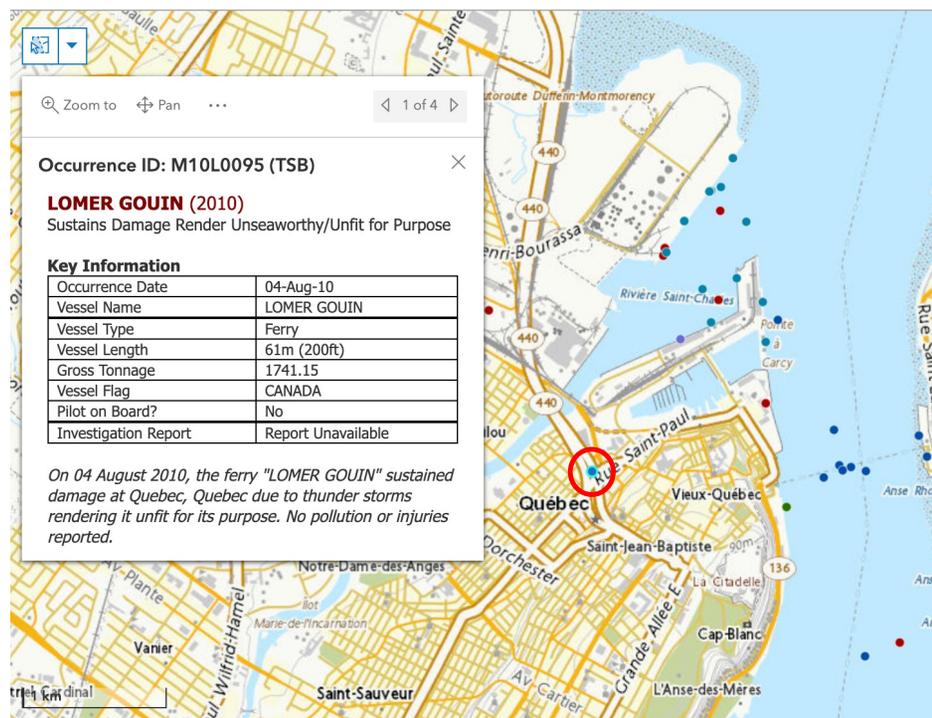
# ALIGNING THE DATA

- Filtered all data sources to only include vessels of interest
- Aligned data for vessel types and marine occurrences
- Conducted manual cleaning
- Validated data using Vessel Traffic Analysis track lines

Aligned Clear Seas Vessel Categories	TSBC Vessel Categories	TSBC Vessel Sub-Categories	USCG Vessel Categories	USCG Vessel Sub-Categories	TC Traffic Attribute Data Vessel Categories	TC Traffic Attribute Data Vessel Sub-Categories	
Cargo – Bulk Carrier	Cargo – solid	Bulk carrier	Bulk carrier	General Ore carrier	Dry bulk	All vessel sub-types	
Cargo – Container Ship		Container ship	General dry cargo ship	Container ship	Container	All vessel sub-types	
Cargo – Vehicle Carrier		Ro-ro cargo	Ro-ro cargo ship	Vehicle carrier	Cargo	Vehicles carrier	
Cargo – Other		General cargo Refrigerated cargo	General dry cargo ship	General Heavy load carrier	Cargo	All vessel sub-types except vehicles carrier	
	Ro-ro cargo	Ro-ro cargo ship	General Ro-ro/container	Ferry/ro-ro	Inland ro-ro cargo ship Merchant ro-ro Ro-ro cargo		
Cargo – Tanker	Cargo – liquid	Product tanker Chemical tanker Crude tanker Combination carrier Liquified gas carrier Chemical/product tanker	Tank ship	Chemical tank ship General Petroleum oil tank ship	Tanker	All vessel sub-types	
		Tanker – chemical/ore/oil/crude					N/A
		Tanker – other					N/A
Ferry		Ferry	(>= 300 GT) Combination Other Passenger Passenger/train Passenger/vehicle	Passenger ship	(>= 300 GT) Ferry General	Ferry/ro-ro	(>= 250 GT) Merchant ferry Other/unknown Rail/vehicles carrier Ro-ro/passenger ship
	Passenger	(>= 300 GT) Passenger only Passenger cargo					
Cruise	Passenger	(>= 10,000 GT) Passenger only Passenger – cargo	Passenger ship	(>= 10,000 GT) Ocean cruise vessel	Passenger	(>= 10,000 GT) Merchant passenger Passenger ship	
Tug	Tug	N/A	Towing vessel	Articulated tug and barge (tug) General Harbor/ship assist (tug) Integrated tug and barge (tug) Pushing ahead (towboat) Towing behind (tug)	Tugs/Port	Articulated pusher tug Pusher tug Towing vessel Tug Tug harbour Tug ocean	

# LIMITATIONS OF THE ANALYSIS

- Data quality considerations for the marine incidents and accidents dataset
  - Public reports, not always verified
  - Some incorrect locations/vessel attributes in dataset
  - Decrease in reported marine casualties in 2015 for the U.S. Coast Guard (USCG) dataset
  - Found additional errors in the marine incidents and accidents dataset that needed to be corrected
- Classification schemes for vessels and marine occurrences that differ from the Transportation Safety Board of Canada (TSBC) and USCG and summarized vessel traffic data

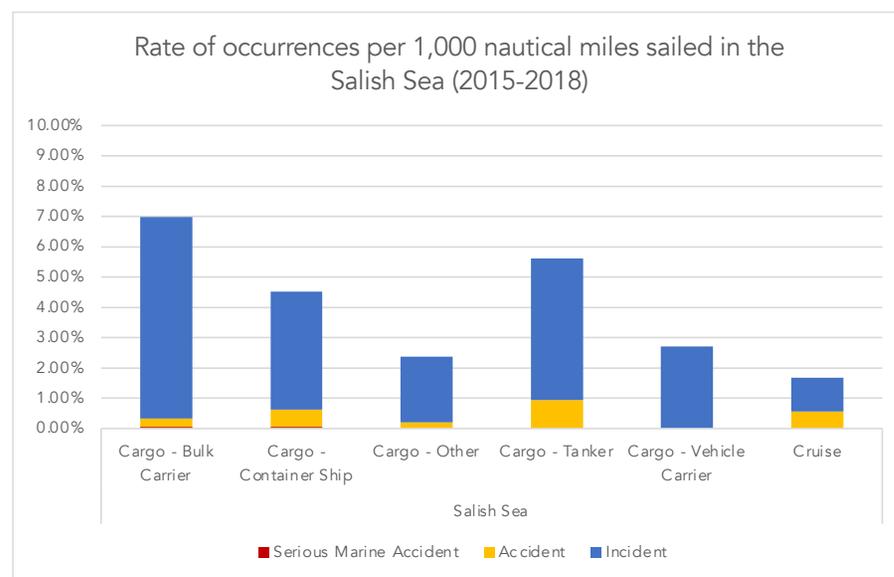
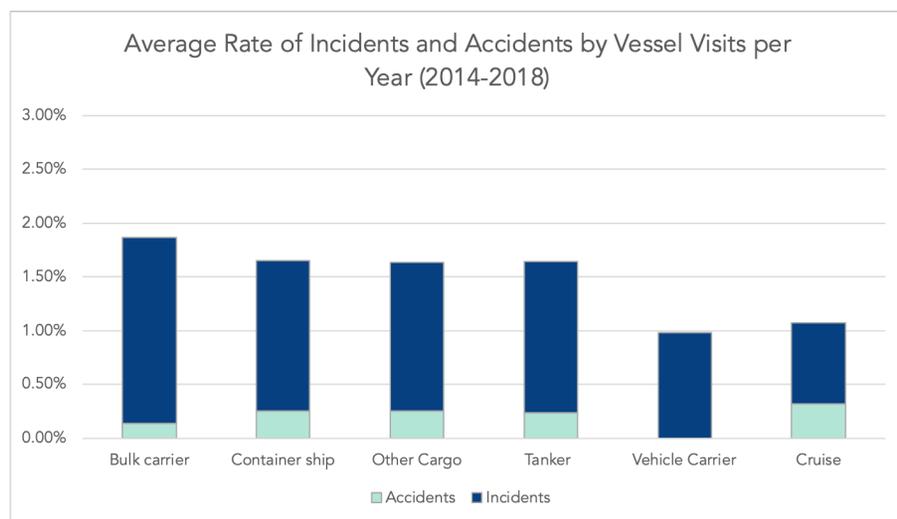


# Insights & Analyses



# SALISH SEA – OCCURRENCE RATES

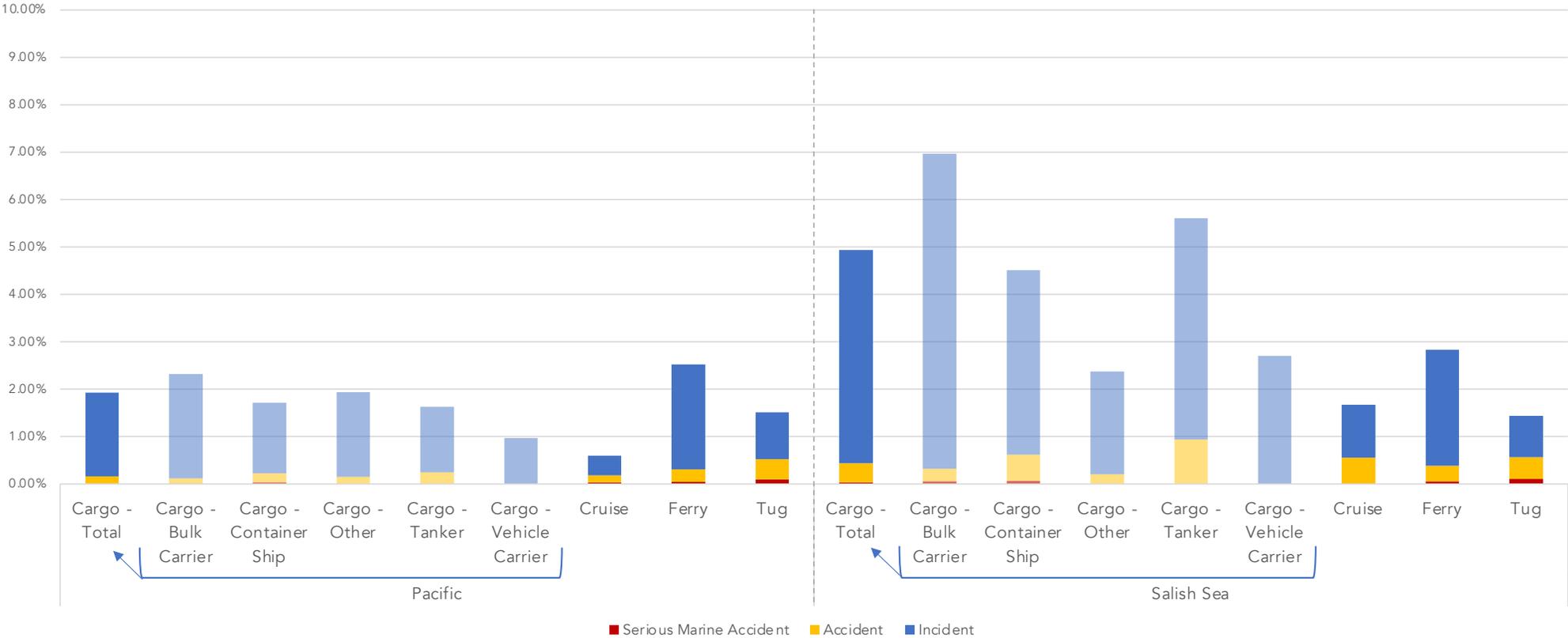
(Version 1: Vessel Visits vs Version 2: Nautical Miles Sailed)



- Cargo vessels, specifically bulk carriers, show the highest rate of occurrences in the Salish Sea
- Similar results to the 2021 Salish Sea analysis using vessel visits from the Vessel Traffic Analysis project

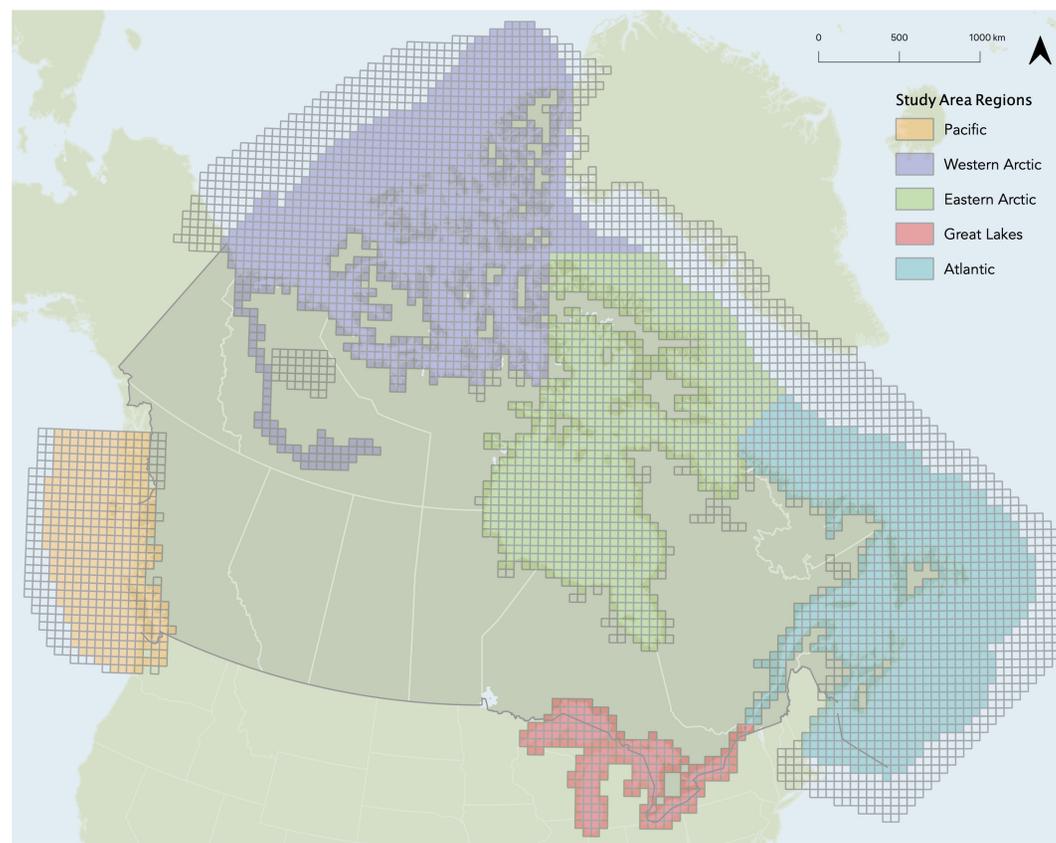
# SALISH SEA – OCCURRENCE RATES (Version 2: Nautical Miles Sailed)

Pacific Region & Salish Sea Sub-Region: Rate of occurrences per 1,000 nautical miles (2015-2018)



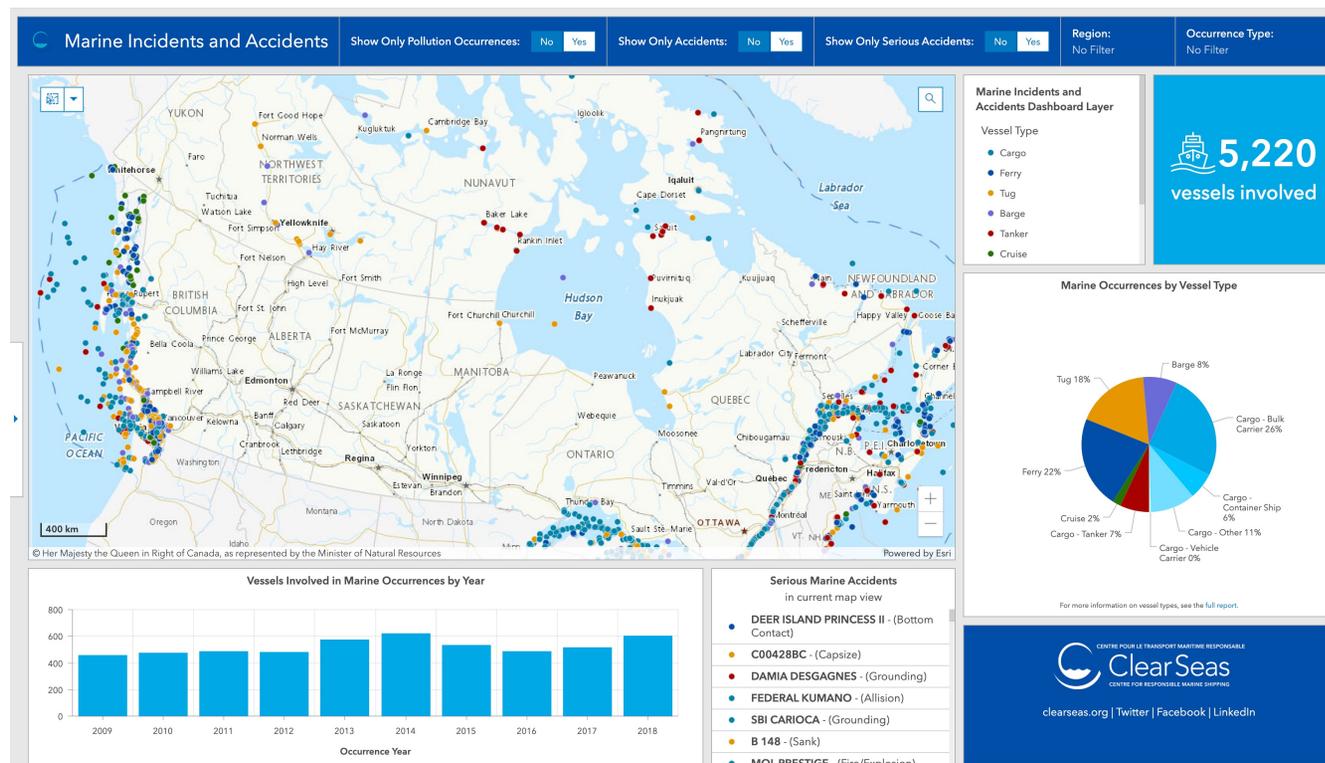
# REPORT: ASSESSING SHIPPING RISK TO CANADA

- Expand shipping risk analysis to other regions in Canada
- Publish data tables as appendices
  - Results may be used to inform other coastal traffic safety analyses by Clear Seas
- Release report in 2022



# MORE MARINE INCIDENTS & ACCIDENTS DASHBOARD

- Plans to update the Marine Incidents and Accidents dashboard and dataset
  - Include more recent data and more types of vessels
  - Incorporate user feedback and functionality suggestions



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