Marine Oil Spill Risk Assessment 2018 (MOSRA18) Summary Report

Prepared for Maritime NZ

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1. Introduction

Assessments of New Zealand's oil spill risk profile have taken place at regular 5-year intervals since 1992, with each version of the modelling building on the one before. The last full assessment was carried out in 2015 (MOSRA 15). MOSRA18 represents an intermediate step. The primary reason for this refresh is to ensure that the risk analysis that underpins the Pollution Levy setting process reflects the current situation and activity. The key factors that were considered and included in the update include: vessel activity and routing, the proportion of oil types carried, and assumptions regarding standards of pilotage across each large vessel sector, ferry schedules and, for tankers, full compliance with IMO Regulation 13G (double hulls and bunker protection). The work was commenced in April 2018

This summary report sets out the changes made and presents the findings in terms of relative environmental risk for each sector and changes from MOSRA15 results.

2. Vessel Activity and Operational Factors

2.1. Foreign Vessels

For MOSRA 18, foreign tankers, foreign container ships, foreign cargo and foreign passenger vessel numbers were derived from an extract of MNZ's Foreign Levy Database; for the period between January 2013 and February 2018. The numbers of foreign fishing and other foreign vessels were left unchanged due to limited time to access new data and because any changes were unlikely to have any material impact on results.

The classification of vessel types in the Foreign Levy Database into two categories required for analysis (*MOSRA Summary Group* and *MOSRA Levy Sector*) remained the same as MOSRA 15, except chemical tankers that were previously included in the foreign tanker levy group are now recognised as *Foreign Cargo/Passenger* vessels. This has had a limited effect on the foreign tanker distance steamed as shown in Table 1.

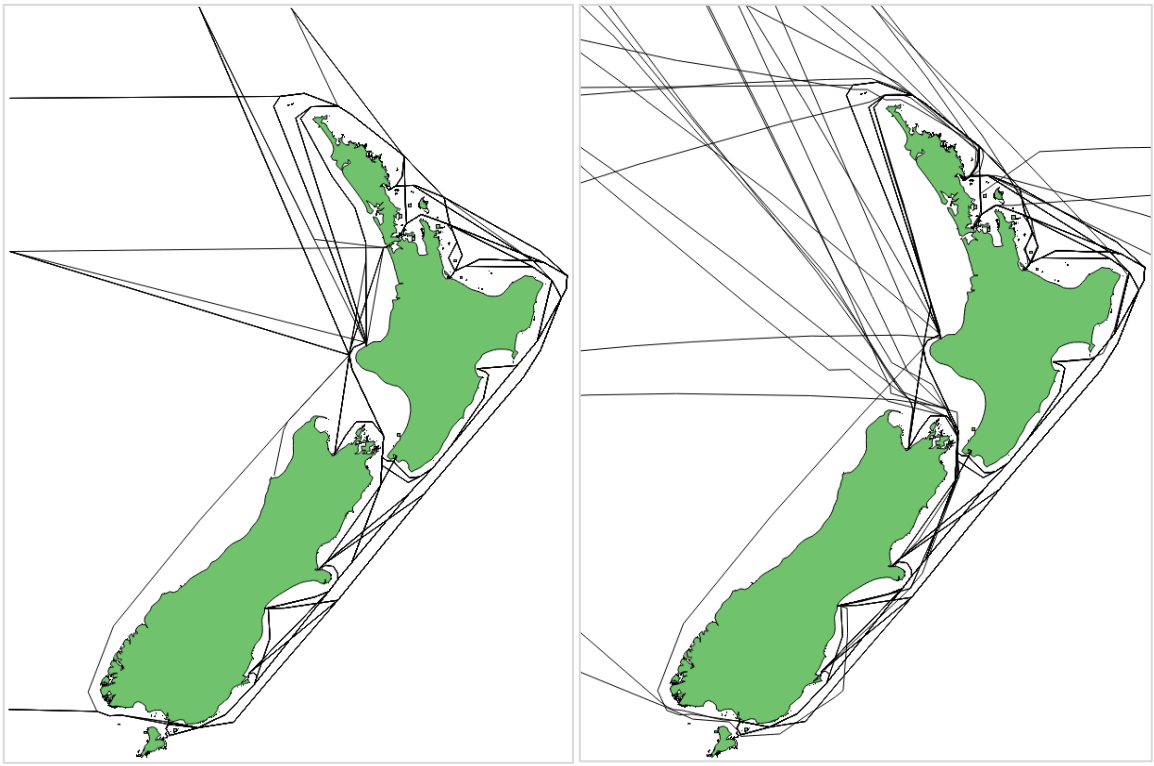
Improved access to AIS data in GIS format has allowed for improved tracking discrimination in MOSRA18 cf MOSRA15 and so the opportunity was taken to refine the modelling offshore routes as shown in Figure 1. Coastal routes (NZ port to NZ port) for foreign vessels were left largely unchanged as differences were found to be limited.

Table 1 Percentage change in distance steamed in NZ waters for foreign tankers, containers, cargo, and passenger ships (MOSRA 15 to MOSRA 18)

Vessel Category	Change in total sector distance steamed in NZ waters (increase / decrease)
Foreign Tankers	- 11.1% (decrease)
Foreign Containers	+12%
Foreign Cargo/Passenger	+13.5%

Note: The distance steamed was determined from the number of model sea-cells transected.

Figure 1 Tracks Foreign Vessels as modelled: MOSRA 15 (left), MOSRA 18 (right).



2.2. Large Domestic Tankers

Coastal Oil Logistics Ltd (COLL) provided detailed data on the oil volumes carried by and voyage records for the large domestic tanker activity. This level of detail had not been available for the MOSRA 15 work. The voyages over a 12-month period – as derived from this data formed the basis of the revised routes in MOSRA18. These differed notably from those in MOSRA15 with relatively more transiting off the east coast and more voyages overall as shown in Table 2. This more comprehensive AIS data combined with detailed voyage information allowed for a greater understanding of total distance steamed and more representative tracks to be derived. While overall MOSRA18 tracks tended to be closer to the coast and cover greater fleet sea miles than in MOSRA15, the model captured the revised operational practice to steam to the east of Great Barrier Island which in turn has had the effect of notably reducing the sectors coastal environmental risk profile.

Table 2 Percentage change in distance steamed in NZ waters by large domestic tankers (MOSRA 15 to MOSRA 18)

Vessel Category	Change in total sector distance steamed in NZ waters (increase / decrease)
Large Domestic Tankers	+38.2%

Note: The distance steamed was determined from the number of model sea-cells transected.

2.3. Domestic Passenger Vessels

As with MOSRA 15, domestic passenger vessel numbers were derived from publicly available ferry timetable information and are summarised in Table 3. Tracks were digitised to cover new routes where required.

Table 3. Percentage change in distance steamed in NZ waters by domestic passenger vessels (MOSRA 15 to MOSRA 18)

Vessel Category	Change in cell transits
Domestic Passenger	+14.4%

Note: The distance steamed was determined from the number of model sea-cells transected.

2.4. Other Vessels

The activity of; foreign fishing and other foreign vessels, small domestic tankers, domestic fishing vessels, and oil production vessels and facilities, were left unchanged as inspection of the data available suggested no material change had occurred. Consequently, routes and activity levels were left unchanged in this refresh.

3. Oil as cargo

The split between persistent and non-persistent oil carried as cargo was updated for both foreign tankers and large domestic tankers based on information in the Foreign Levy Database and as provided by COLL. The classifications used to further break down the two categories into the five oil-classes are as for MOSRA10 and MOSRA15. Assumptions regarding amounts of oil carried were left unchanged to preserve comparability between sectors as updated information was not available for other vessel groups.

4. Probability Algorithms

The underlying algorithms (incident probability, wind, currents, and navigational hazards) remain as used in MOSRA 15 was not changed. However, full compliance with IMO regulation 13G was incorporated into the model for all tankers. 13G requires all vessels of over 5000DWT of oil to be double hulled and have full bunker protection. Specifically, this was done with 2 factors – one that calculates the chance of a spill occurring in the event of an incident, and the other calculating the amount of oil that would be expected to be released to the environment in the case of a spill. Additionally, management factors have been revised for all vessel types to reflect a uniform standard of pilotage around the country and across all large vessel fleets.

5. Results

The results of MOSRA 18 are summarised below in Table 4:

Table 4. Sector share of risk

Sector	% Sector share (3dp)	% Change from MOSRA 15 (3dp)
Domestic Passenger, Cargo, and Tanker Bunker (includes tugs)	**16.688**	6.328
Domestic Tankers - Oil as Cargo	**11.314**	-7.306
Persistent	3.059	-1.841
Non-persistent	8.254	-5.466
NZ Fishing	**1.053**	0.141
Foreign Passenger and Cargo, Foreign Tanker Bunker	**26.765**	15.545
Foreign Tanker - Oil as Cargo	**44.147**	-14.635
Persistent	34.914	-9.445
Non-persistent	9.233	-5.190
Offshore Oil and Gas - total	**0.033**	0.004
Platforms	0.001	
Wells	0.000	
Pipelines	0.000	
Flowlines	0.000	
FPSOs	0.024	
Shuttle Tankers	0.008	
Total	**100.00**	

Note: A negative % figure represents a decrease compared with MOSRA15 results.

6. Summary

MOSRA18 represents a refresh of MOSRA15. Large vessel activity has been brought up to date and modelling of routing refined. A greater level of details has been available for domestic tanker activity and the oil carried.

Sector contributions decreased markedly for both foreign and domestic tankers – this is predominantly attributable to the inclusion of factors to account for full compliance with IMO Regulation 13G and changes in the routing of domestic tankers. Increases in passenger vessel activity are also noted. As sector contribution is a relative measure, this necessarily results in increases for other vessel groups.