Australian Government
Australian Maritime Safety Authority

Leveraging Predictive Tools for Effective Maritime Emergency Response

Case studies from AMSA

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Introduction

- Why and where AMSA needs access to modelling?
- Oil spill trajectory modelling
- Container drift modelling
- Large vessel drift tool
- Search and Rescue drift modelling

Shen Neng grounding, GBR 2010 (Image: QLD Government)

Why AMSA needs access to modelling?

- Functions of AMSA are to:
  - Protect the environment from pollution
  - Manage ship breakdowns (casualties)
  - Save lives through coordinating search and rescue action

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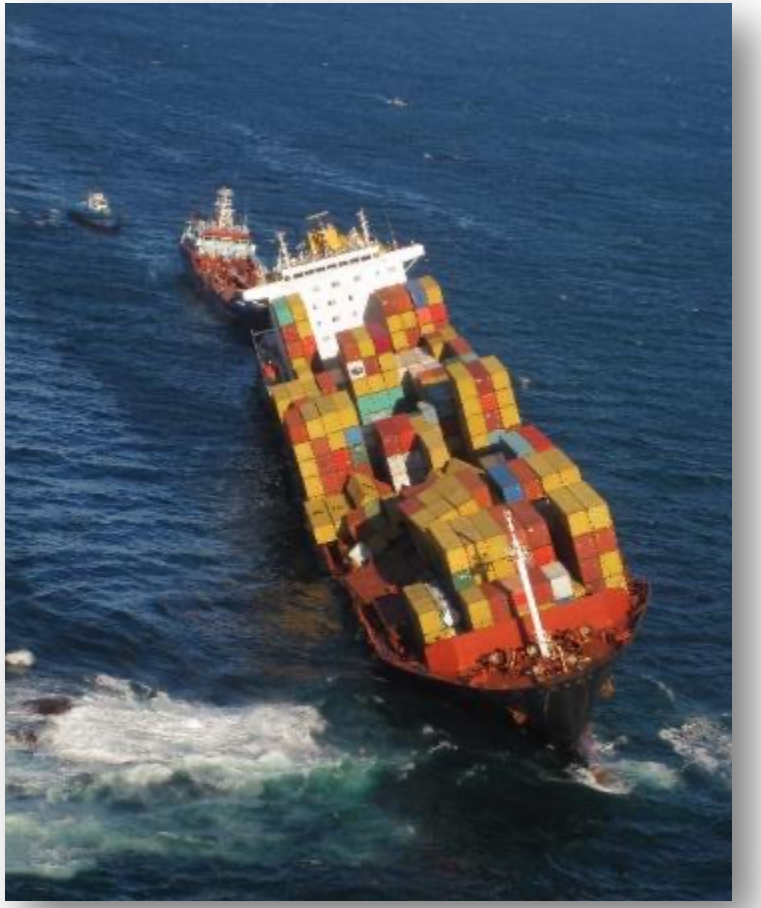
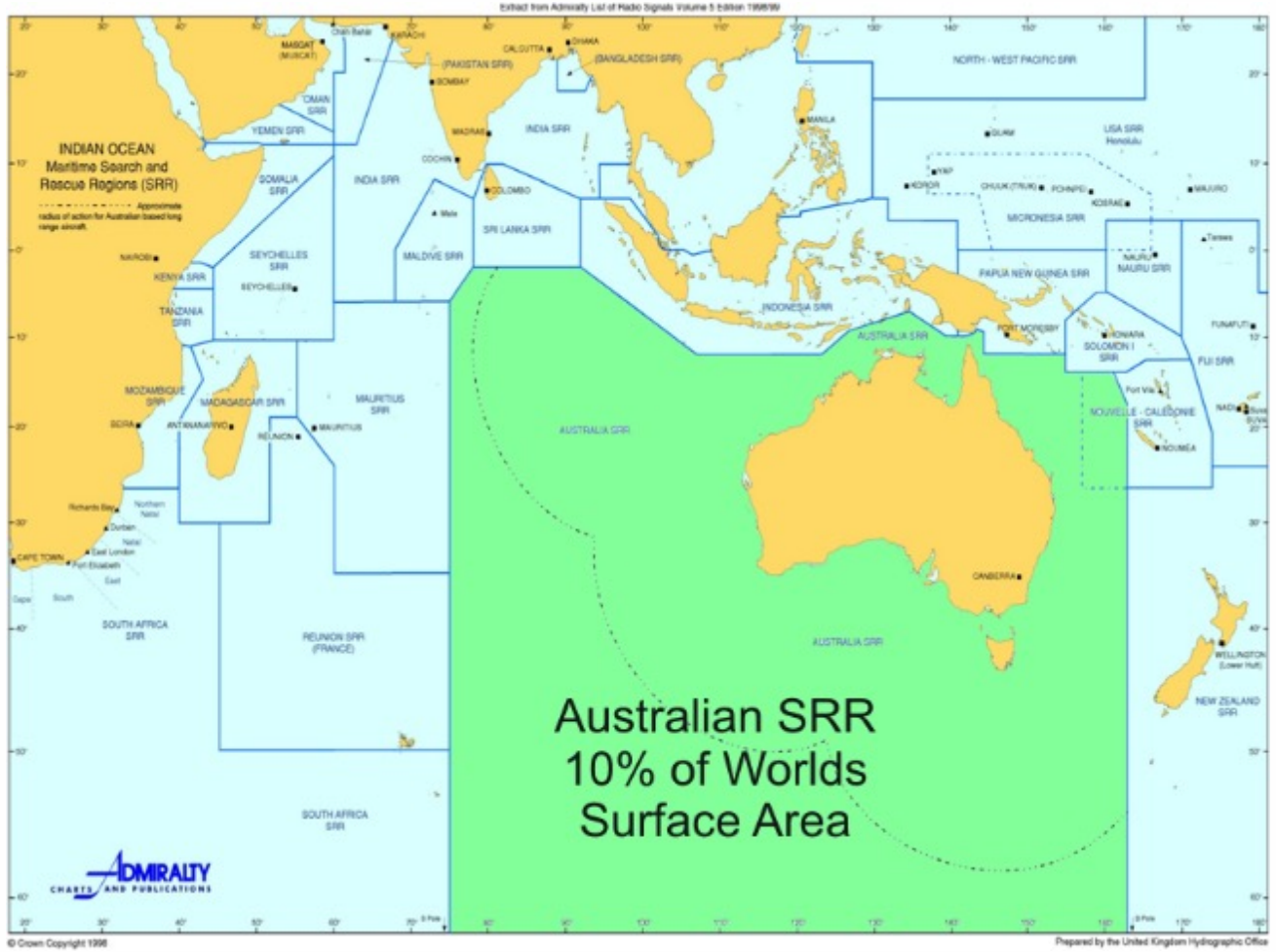


Rena oil spill, Bay of Plenty (NZ) 2011
(Image: Giovanna Lorenzin - AMSA)

Where do we need the models?

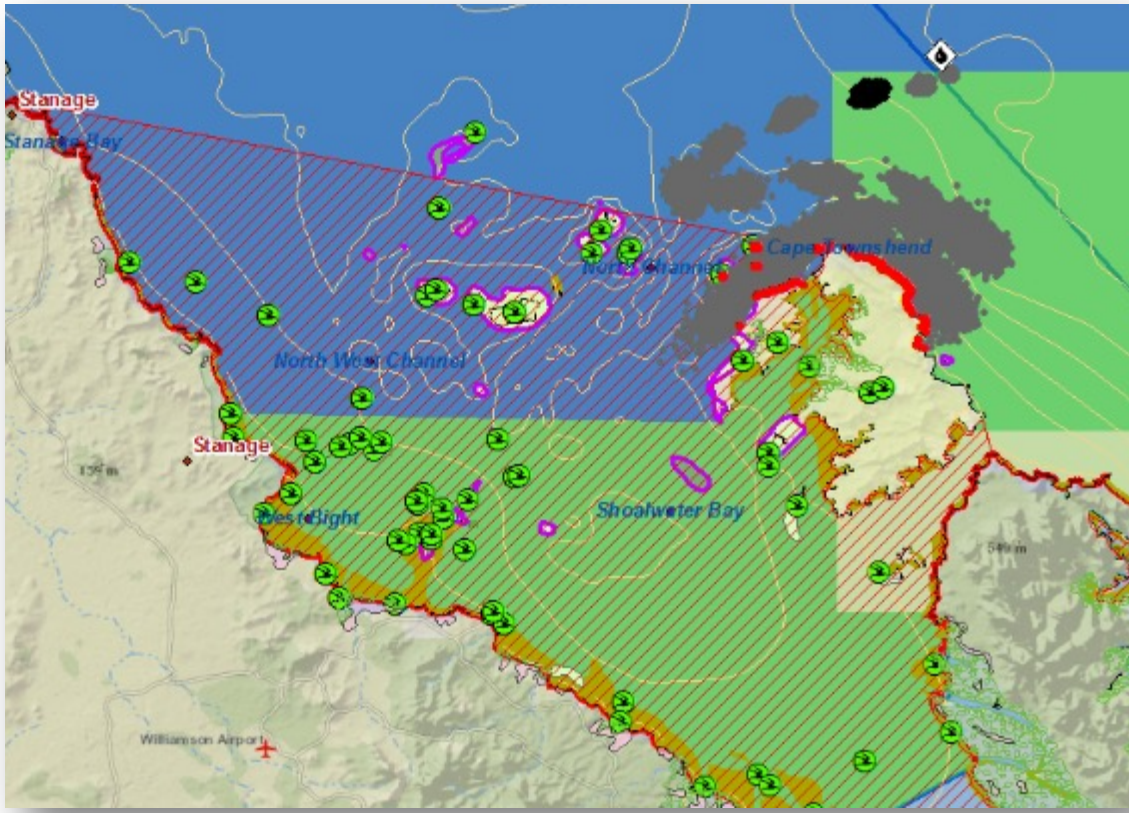
- Australian EEZ - Oil spill and Shipping Casualty Management
- Australian Search and Rescue Region – for search and rescue
- Global – to support regional partners



Map: Admiralty Charts and Publications

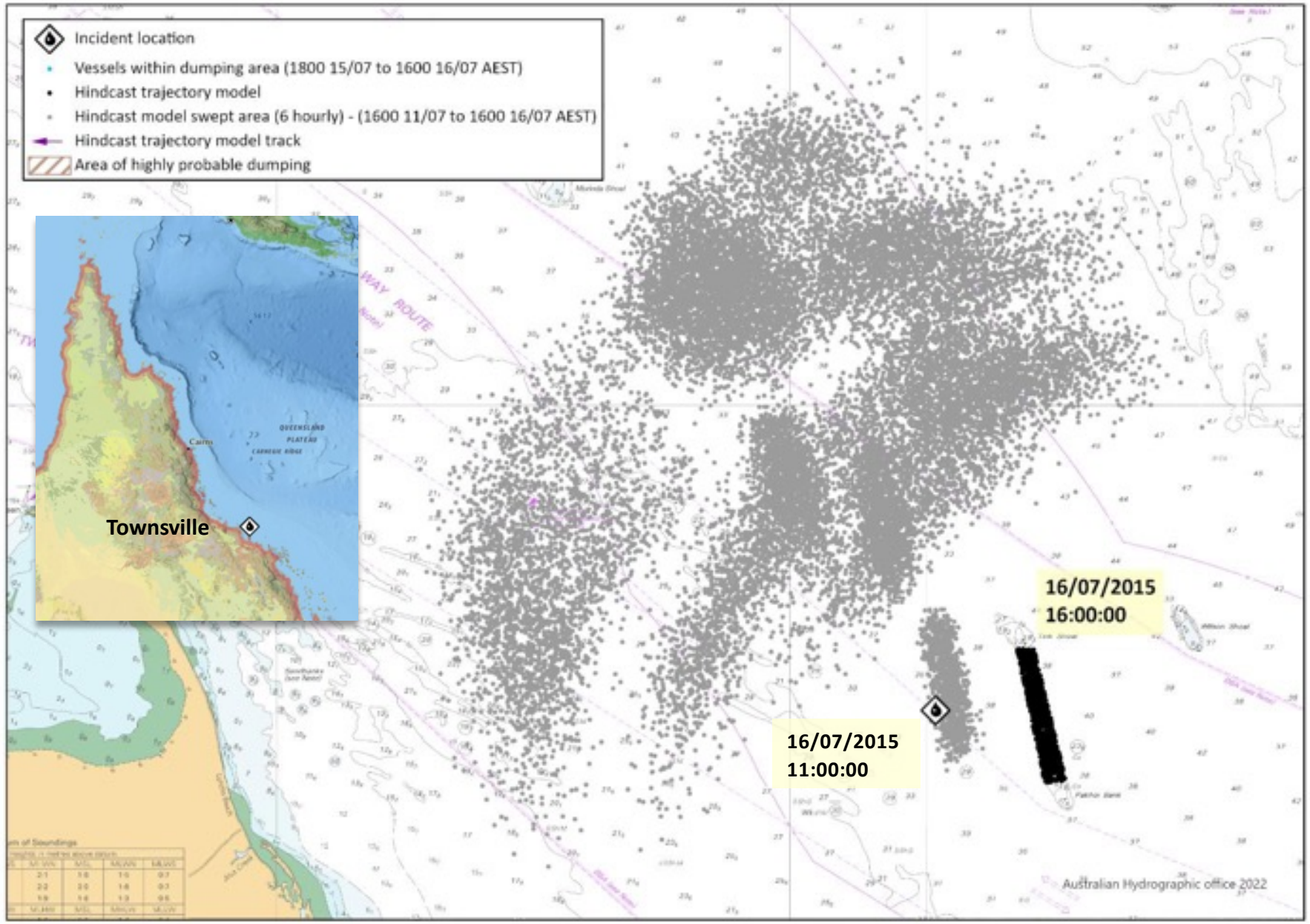
Oil Spill Trajectory Model (OSTM)

- During an oil spill, **the first concern** is:
  - What is the direction and speed of movement?
  - How will the oil weather and spread?
  - What will the oil impact and when?
- Predicts speed of movement, weathering and spreading characteristics of the oil under prevailing currents and weather
- **Spill data**: location, oil type, volume, release time/date, spill duration
- **Accuracy:**
  - Input data
  - Consensus forecasting



OSTM example from OILMAP software from RPS

Mystery spill (July 2015) – *Cape Upstart (GBR)*



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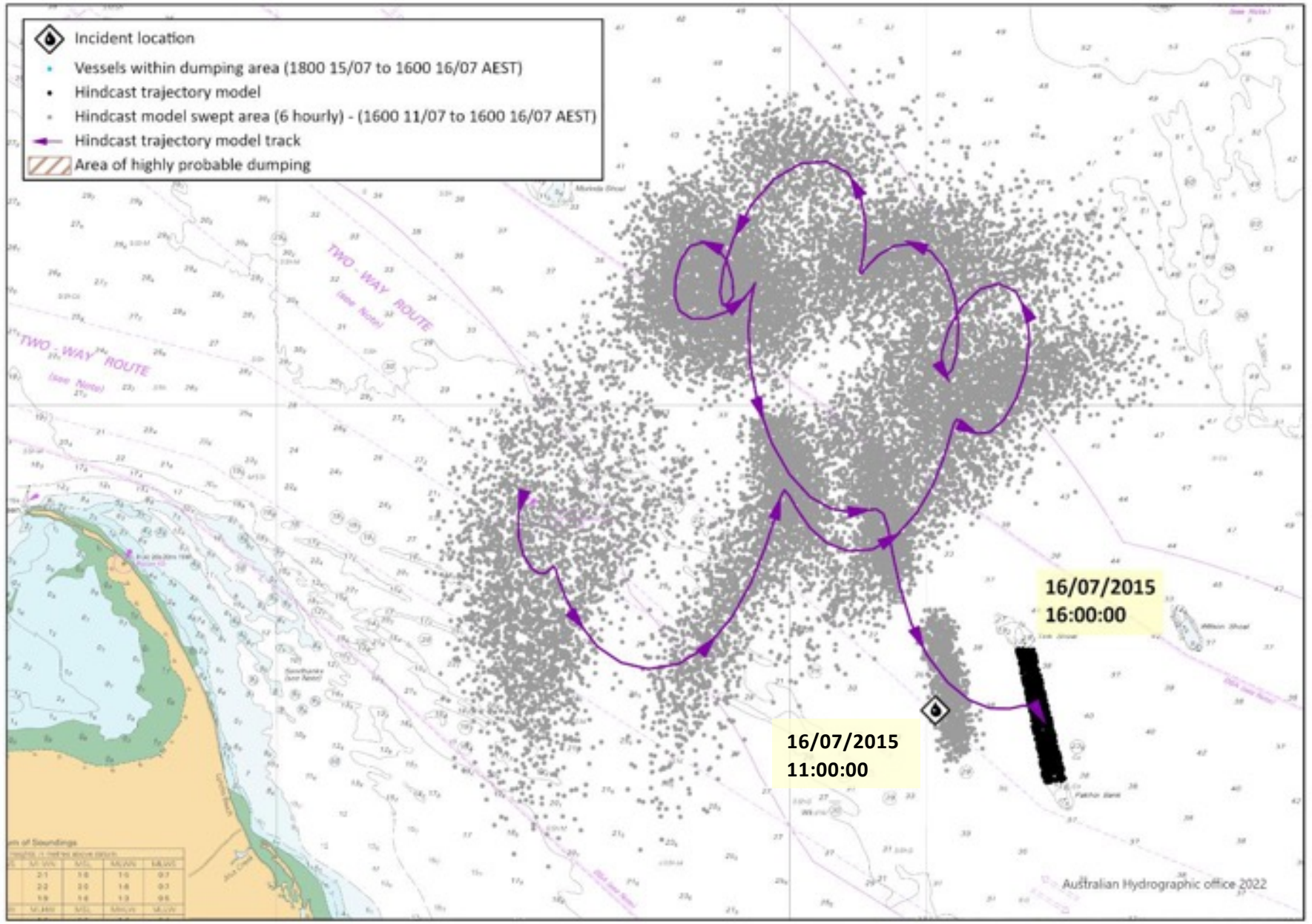

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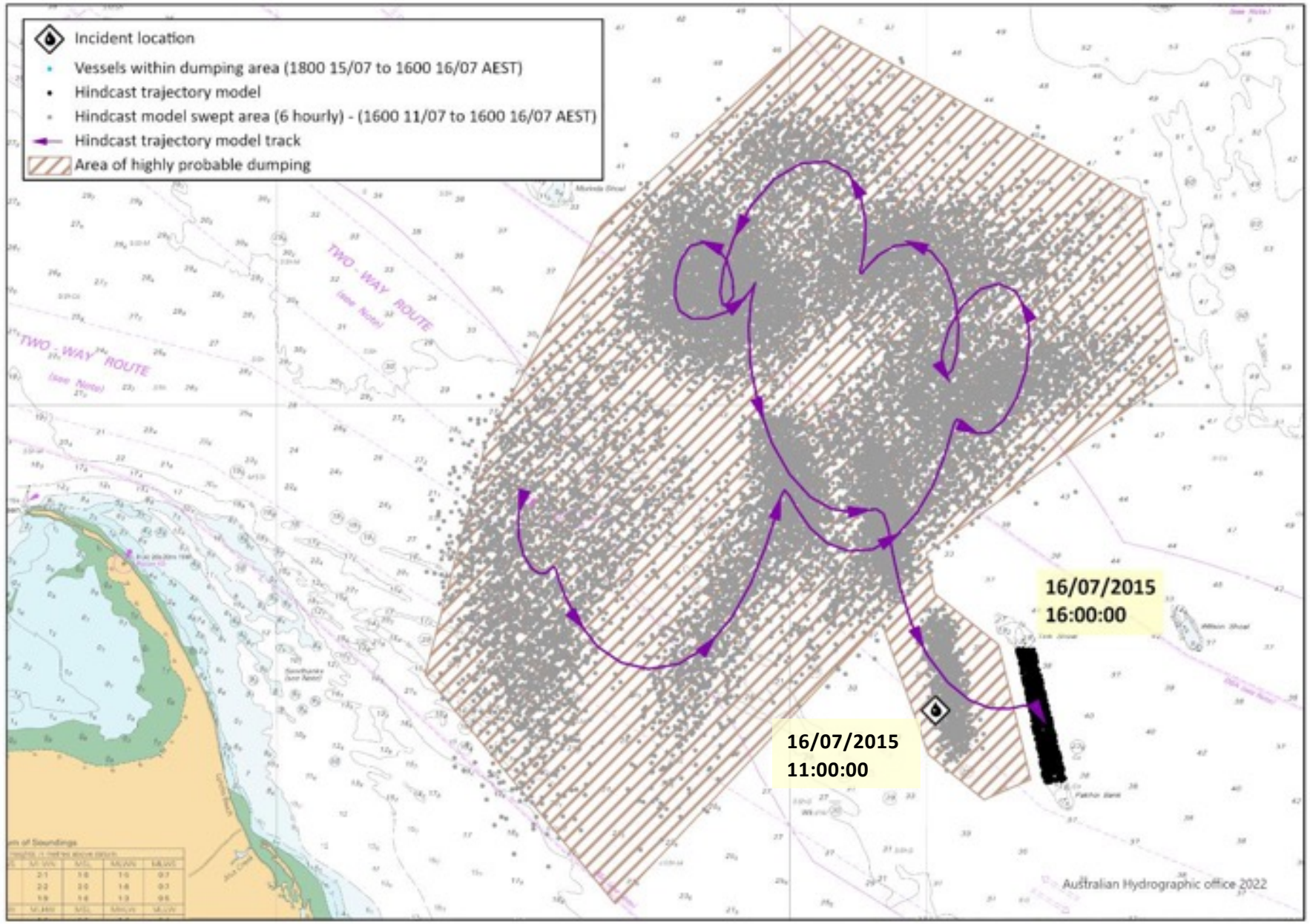

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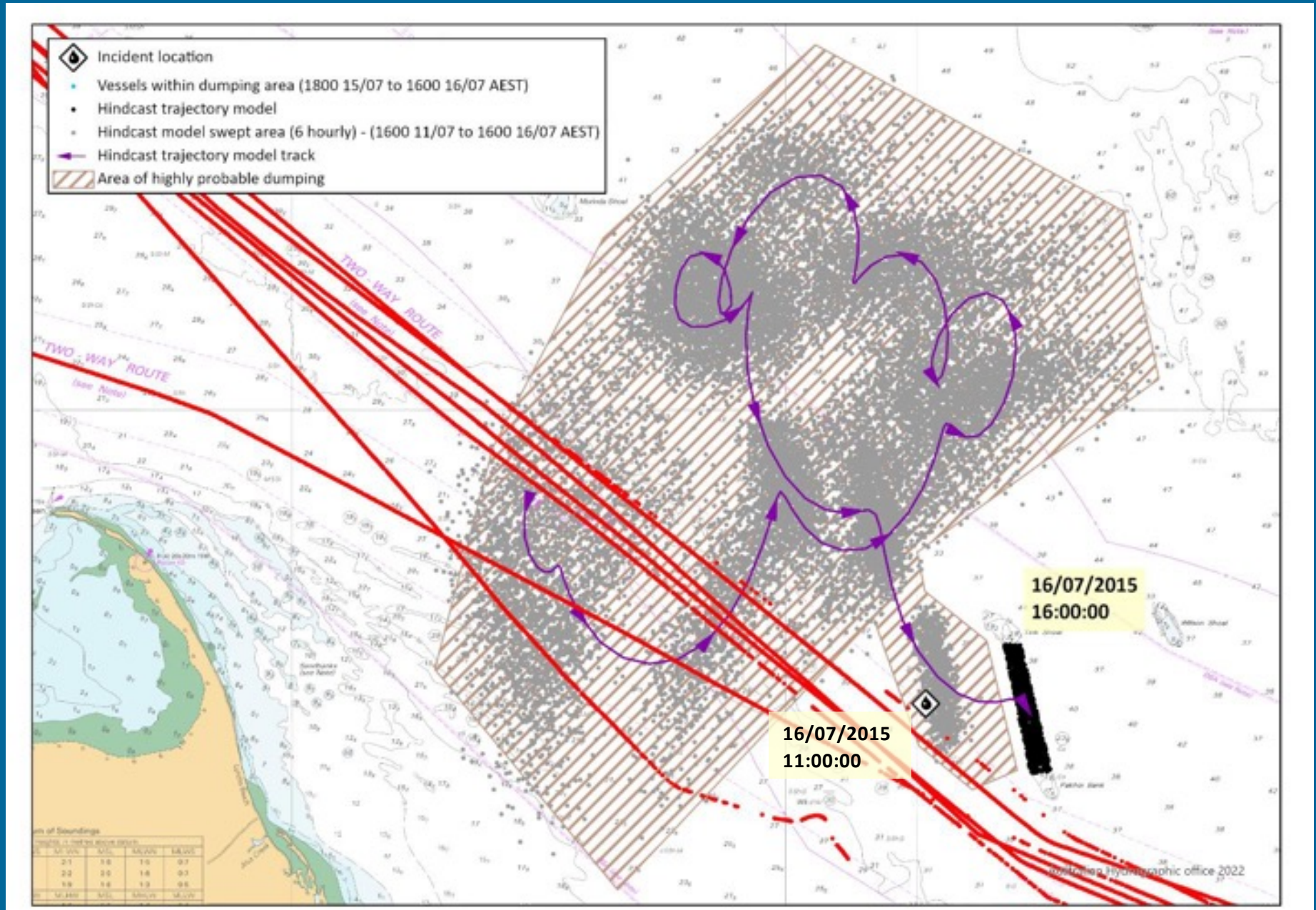

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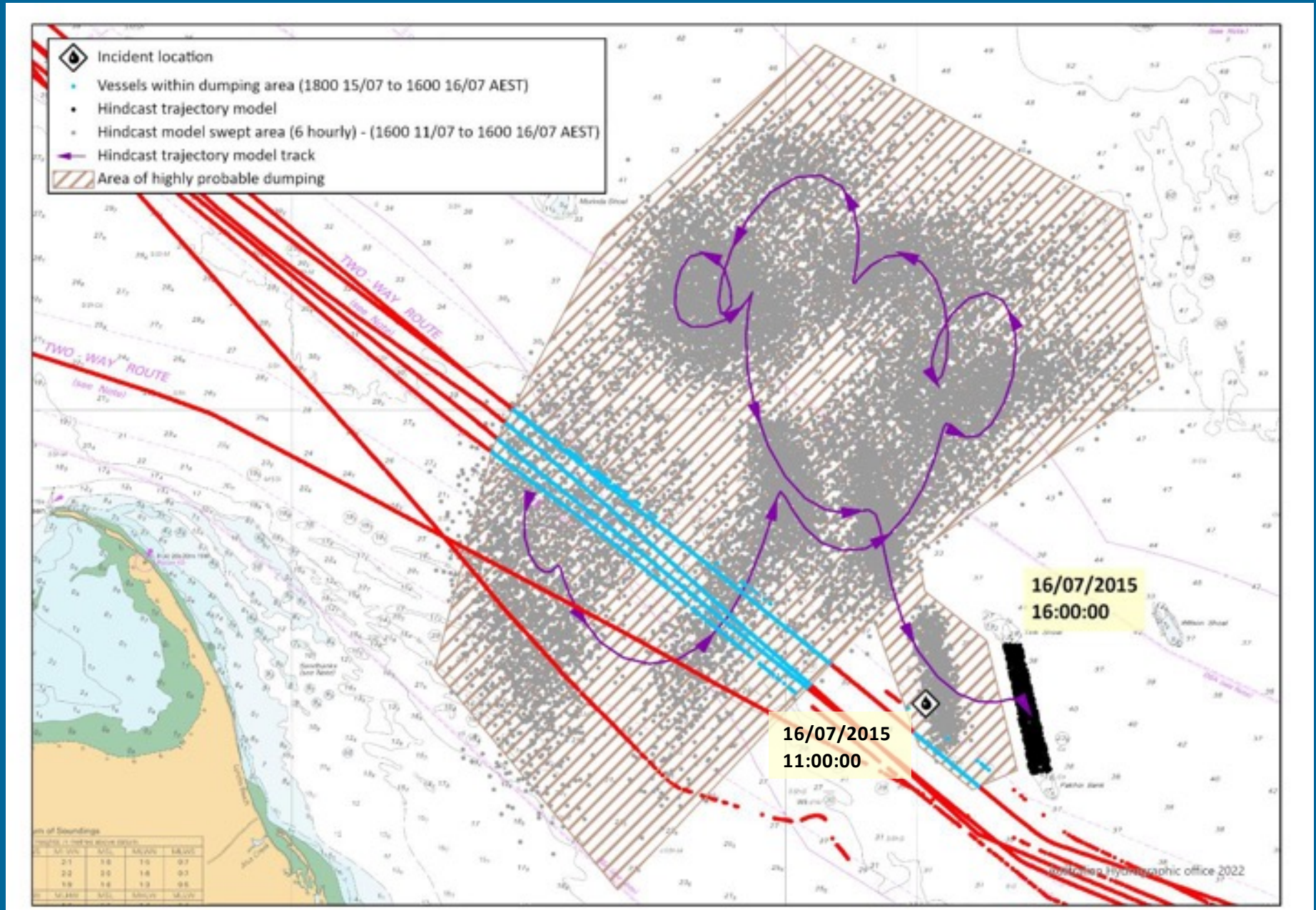
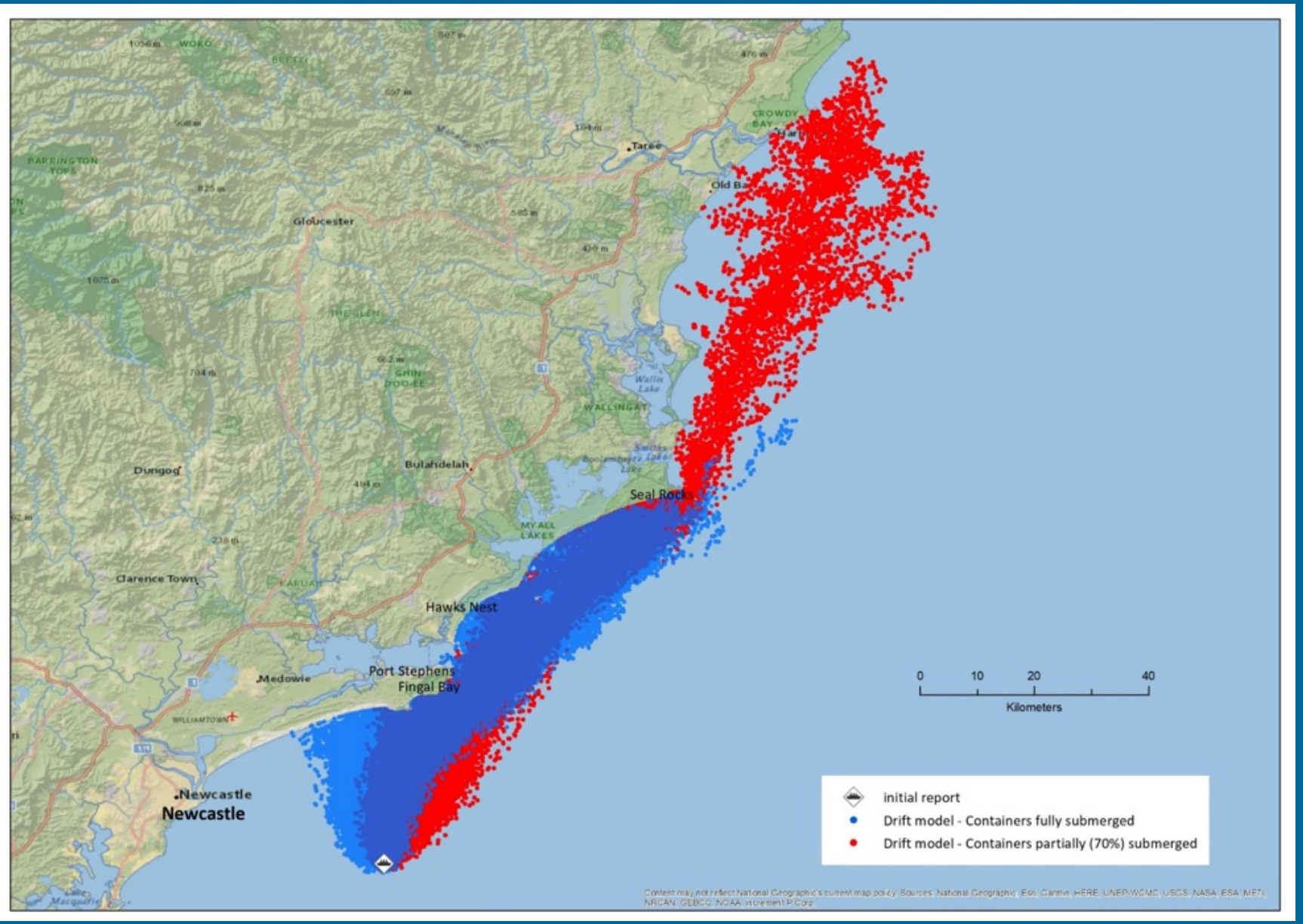


Containers overboard (June 2018) – *YM Efficiency*

Model generated in SARMAP software - RPS

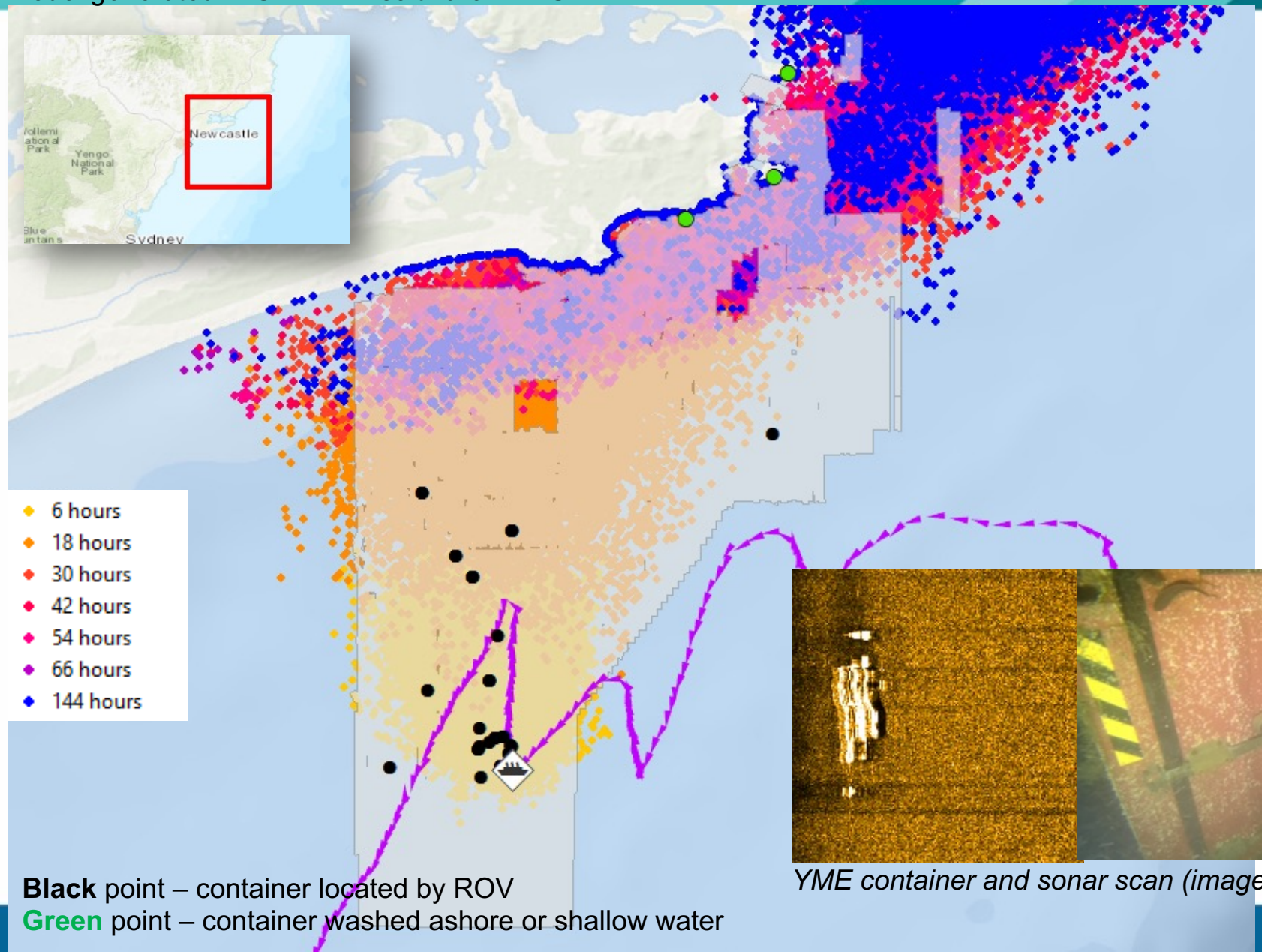


- YM Efficiency – loss of 81 containers – 1 June 2018 off Newcastle (NSW)
- Drift model to help locate and retrieve containers

YM Efficiency (Image: Challenger rescue aircraft)

Containers overboard (June 2018) – *YM Efficiency*

Model generated in SARMAP software - RPS



YME container and sonar scan (images: Subsea)

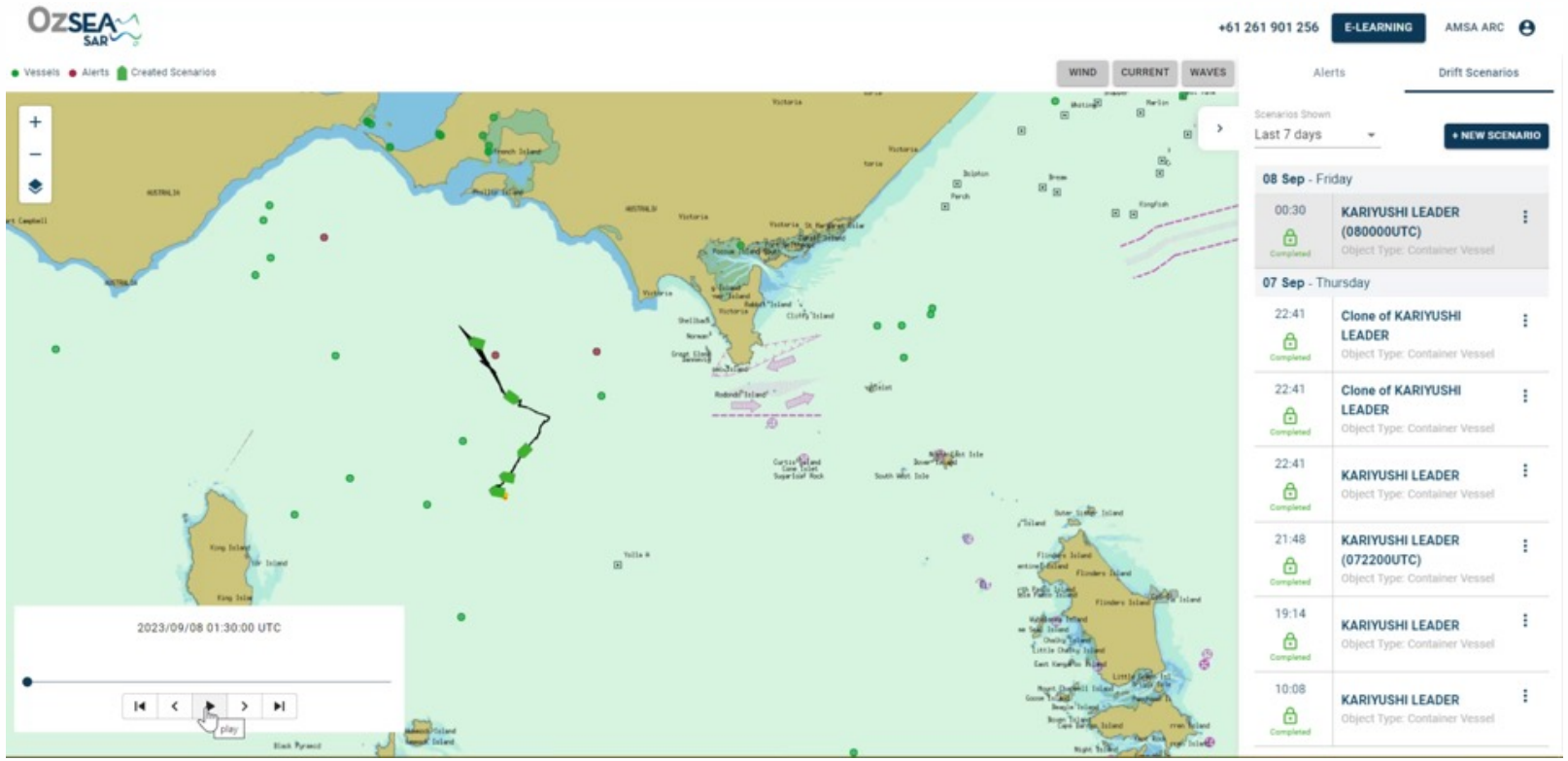
Black point – container located by ROV
Green point – container washed ashore or shallow water

Large Vessel Drift - Kariyushi Leader - Disabled

- Kariyushi Leader – disabled steering – 6 September in Bass Strait
- Storm force winds forecast in 36 hours.
- Drift models allow timely decision making – closest emergency towage asset around18 hours from scene

Drift Model Output

- OzSea SAR Drift Forecast – by Seaport OPZ indicated high likelihood of grounding if no action taken.
- Various scenarios were modelled to determine best course of action
- Ship was given direction under Protection of the Sea (Powers of Intervention) Act 1981 to take tow.



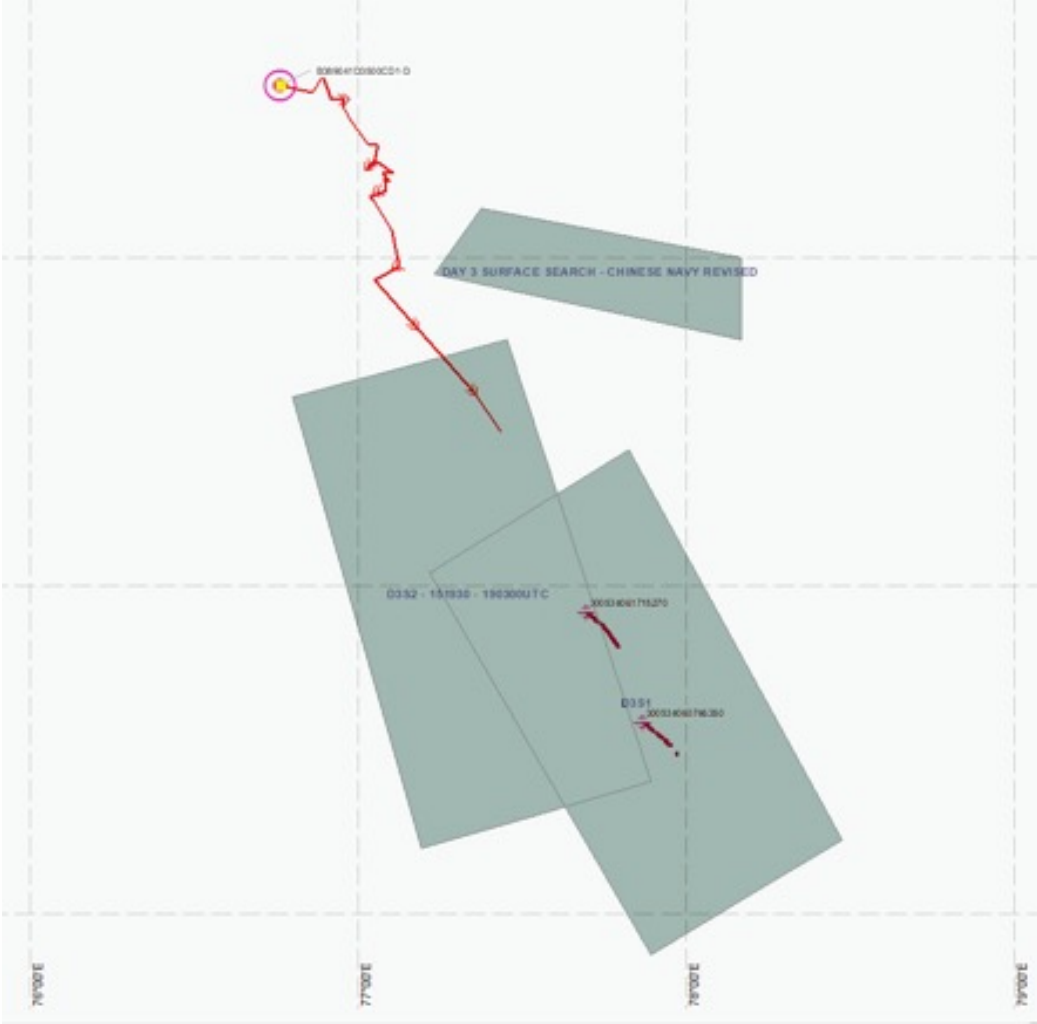
Model generated in OzSeaSAR software (DHI)

Search & Rescue Drift Modelling

- What am I searching for?
- What is my datum?
- Where do I look?

Determination of model inputs (target types)

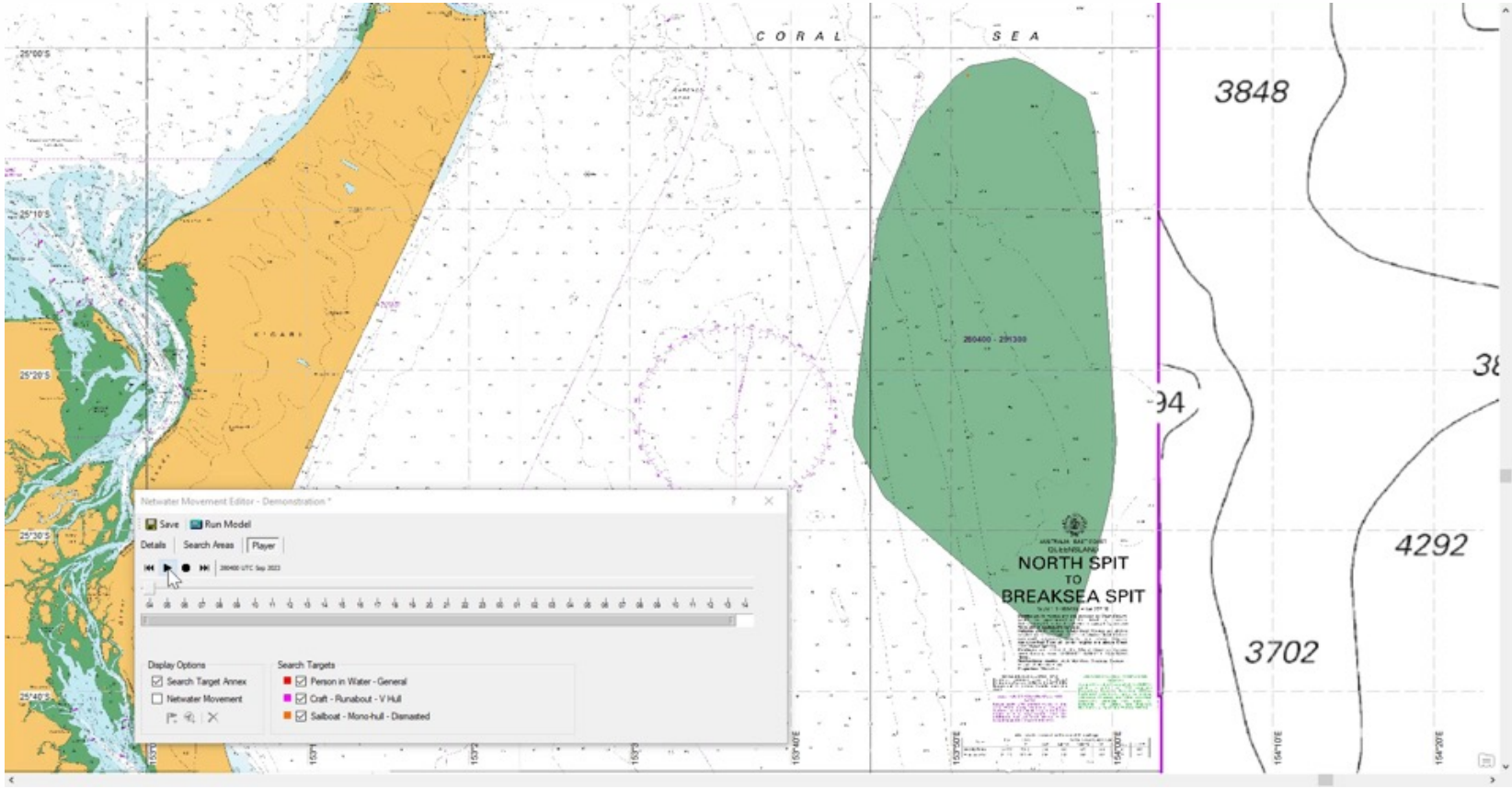
- Affects drift characteristics
- Affects search track spacings



Model generated in NetWaterMovement software - NEXUS

Drift Model Output

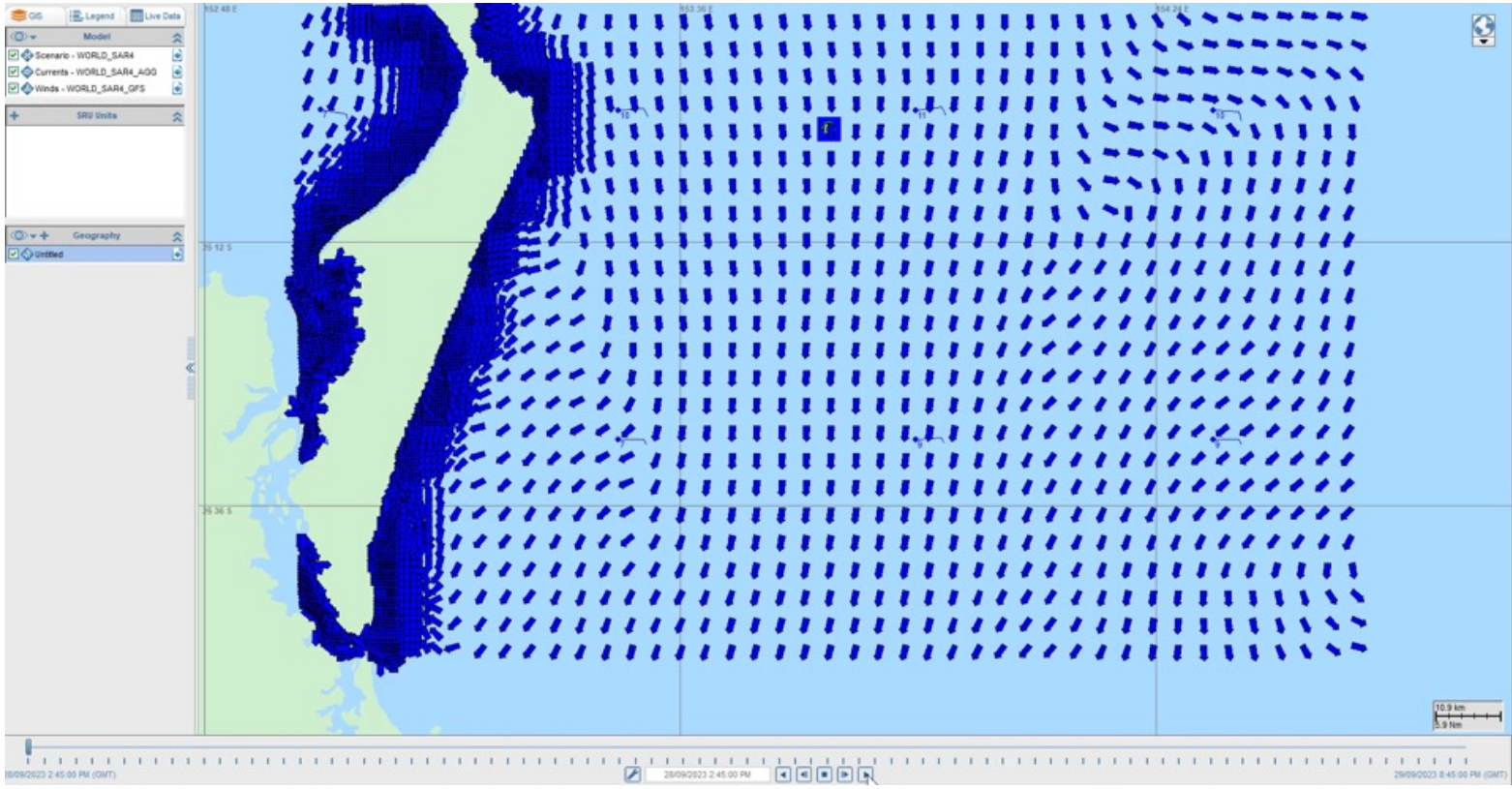
- Different target types are affected differently by wind (leeway)
- Search areas must
  - be developed quickly
  - be validated
  - allow for unknowns



Model generated in NetWaterMovement software - NEXUS

Consensus Modelling

- ASA Software SARMAP used to provide validation by allowing users to select different data sets.
- HYCOM / GFS / BLUELINK / ACCESS
- Useful in distant areas of our search and rescue region
- supporting foreign search and rescue authorities.



Model generated in SARMAP software - RPS

Validation of Drift Planning

- Self Locating Datum Marker Buoys (SLDMB's)
- Run multiple models on different platforms for consensus
- BoM local weather observations
- Local knowledge
- Surface drift observations from assets on scene

Video: Challenger rescue aircraft

Thank you…

Montara oil spill 2009 (image: Mark Hamilton Photography)

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