



Rescue Towing Analysis Model

Tug Escort and ERTV Analyses

Adam Byrd, Alex Hess, Alex Suchar, James Murphy, JD Ross Leahy, Michael Koohafkan



June 8th, 2022

Today's agenda

1

Introduction

2

Analysis Approach

3

Inputs and Assumptions

4

Topics for Feedback

5

Questions and Comments

Materials for Today's Event



ERTV Analysis Scope of Work



Tug Escort Analysis Scope of Work



Combined Analysis Plan



How can we examine potential policies for their ability to reduce the risk of oil spills?



Model Analysis Projects

Evaluation of Tug Escorts

“To inform rule making, the Board of Pilotage Commissioners must conduct an analysis of tug escorts using the model developed by the Department of Ecology”

Evaluation of a Response Tug

“Quantitatively assess whether an emergency response towing vessel serving Haro Strait, Boundary Pass, Rosario Strait, and connected navigable waterways will reduce oil spill risk”



Model Development Outreach and Consultation

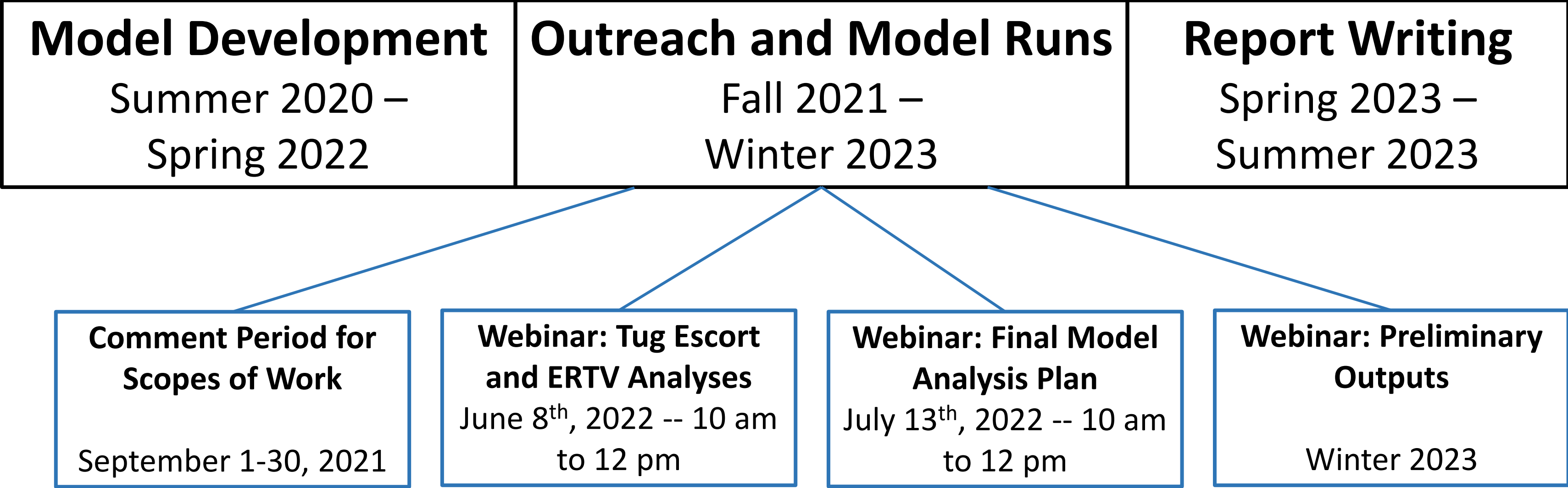
Model Development

June 2020 – October 2021

- 9 Webinars
- 8 Technical discussions
- Over 300 participants
- Over 200 questions and comments



Outreach and Consultation Timeline



Tug Escort Analysis



Evaluate the potential change in oil spill risk from covered vessels resulting from the use of tug escorts by specified tank vessels in waters east of New Dungeness Light/Discovery Island Light.

Ecology – BPC Coordination



BPC Lead

- Rosario Tug Escort Implementation
- Geographic Zone Identification
- Analysis of Tug Escorts Using Model
- Conduct Tug Escort Rulemaking



DEPARTMENT OF
ECOLOGY
State of Washington

Ecology Lead

- Develop Model
- Report on ERTV Analysis
- Report on Tug Escort Analysis



Ecology – BPC Coordination

Tug Escort Rulemaking

- Risk Model analysis is one of many considerations



Emergency Response Towing Vessel Analysis



To quantitatively assess whether an emergency response towing serving Haro Strait, Boundary Pass, Rosario Strait and connected navigable waterways will reduce oil spill risk from covered vessels.

Analysis Approach

Focused on a Primary Hazard

- Drifting aground following a loss of propulsion

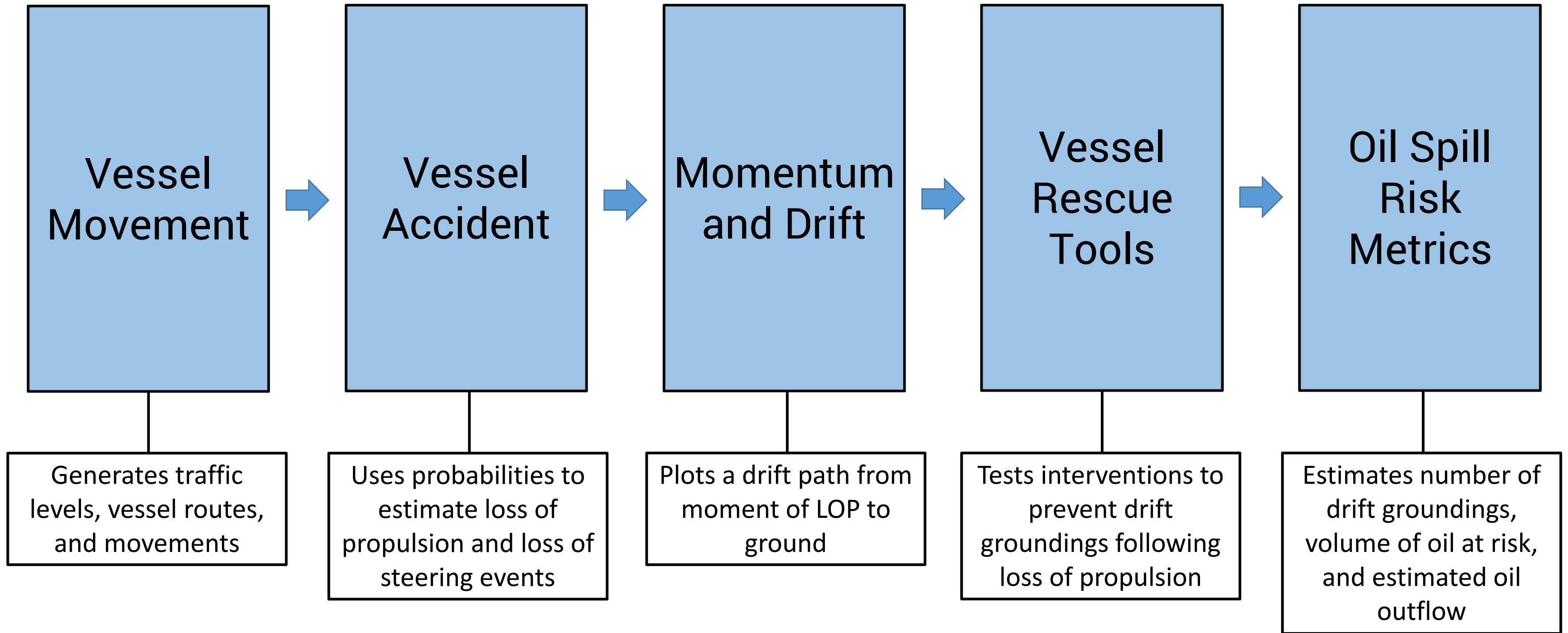
Evaluating A Single Intervention

- How tugs intervene in event chain between loss of propulsion and grounding

Image: <https://gcaptain.com/the-amazing-race-to-save-the-modern-express-in-photos/>



Analysis Approach: The Rescue Towing Analysis Model



Communicating Model Structure

Webinars include:

- Model Structure
- Input on Assumptions
- Questions and Discussion

Analysis Plan includes:

- Model and Analysis Methodology

Model Description includes:

- Model Details



Rescue Towing Analysis Model

Simulate a vessel transit

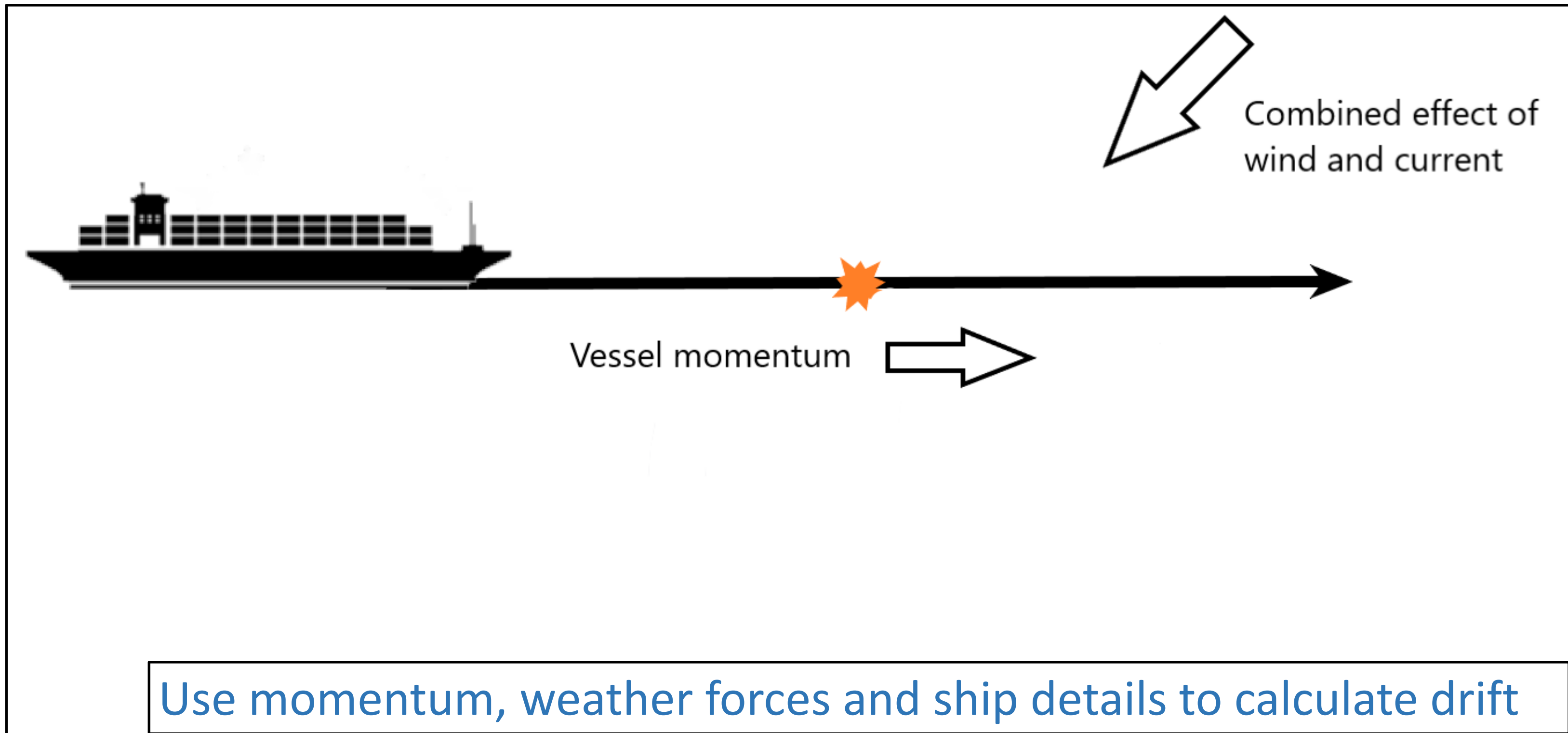


Rescue Towing Analysis Model

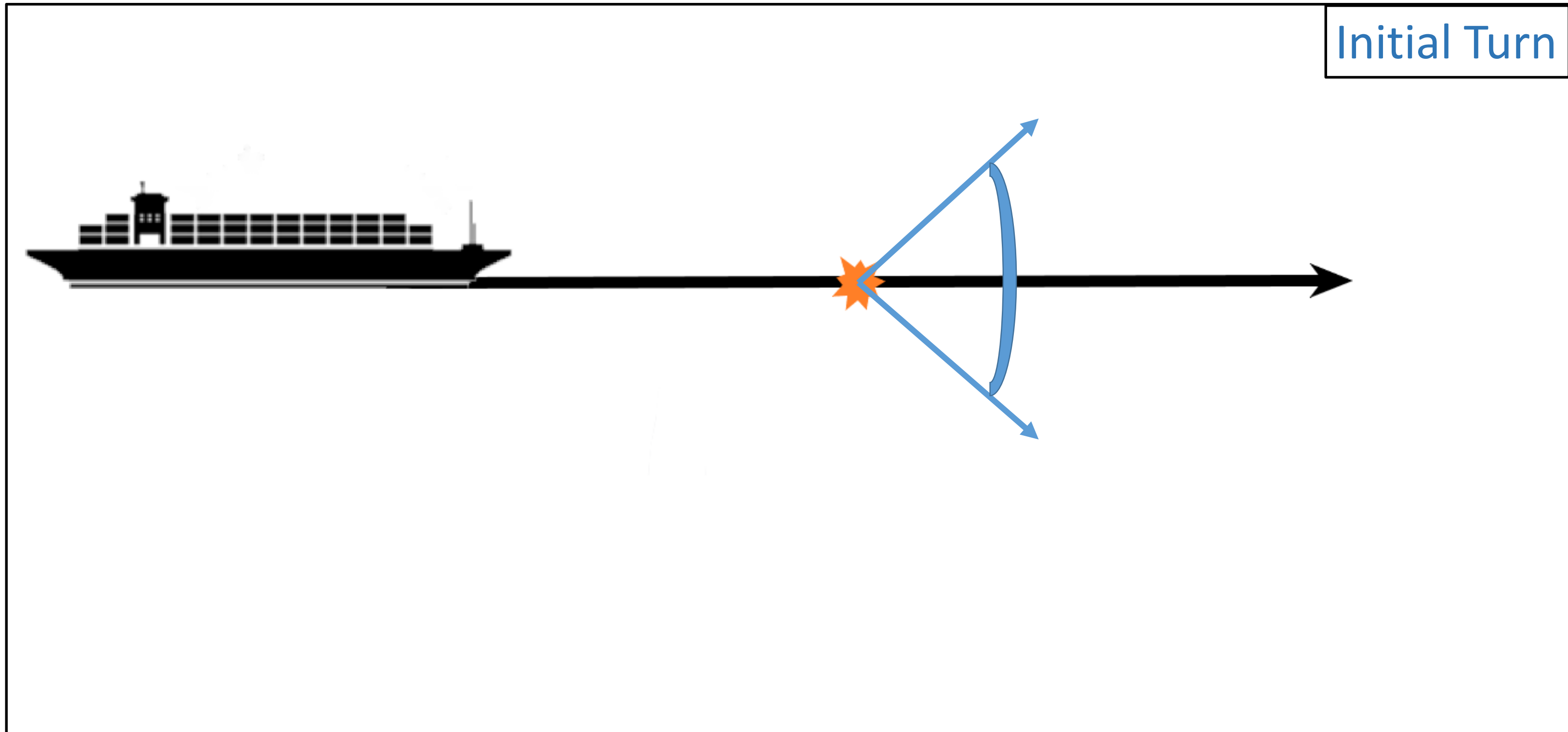
Probabilistically select a moment for loss of propulsion



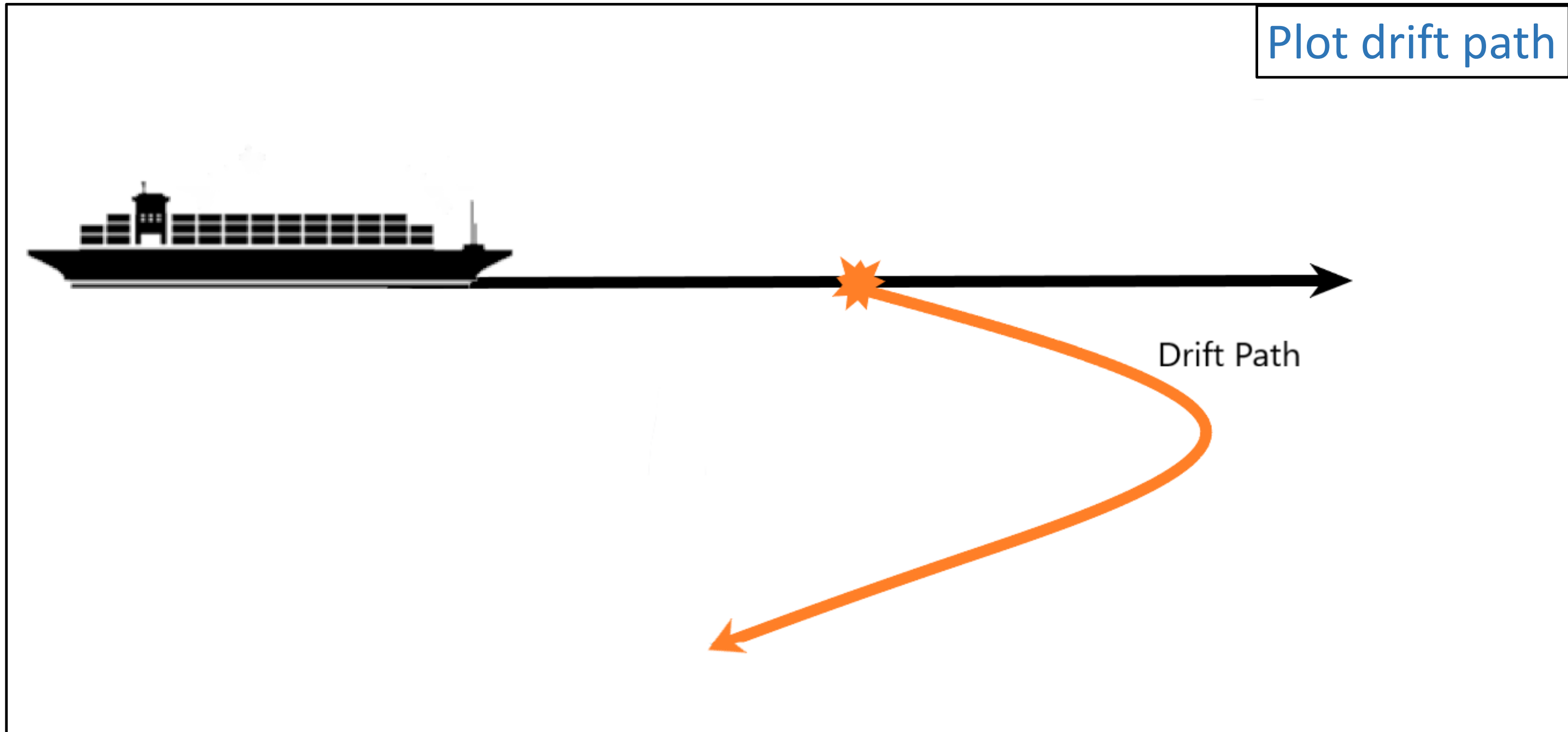
Rescue Towing Analysis Model



Rescue Towing Analysis Model

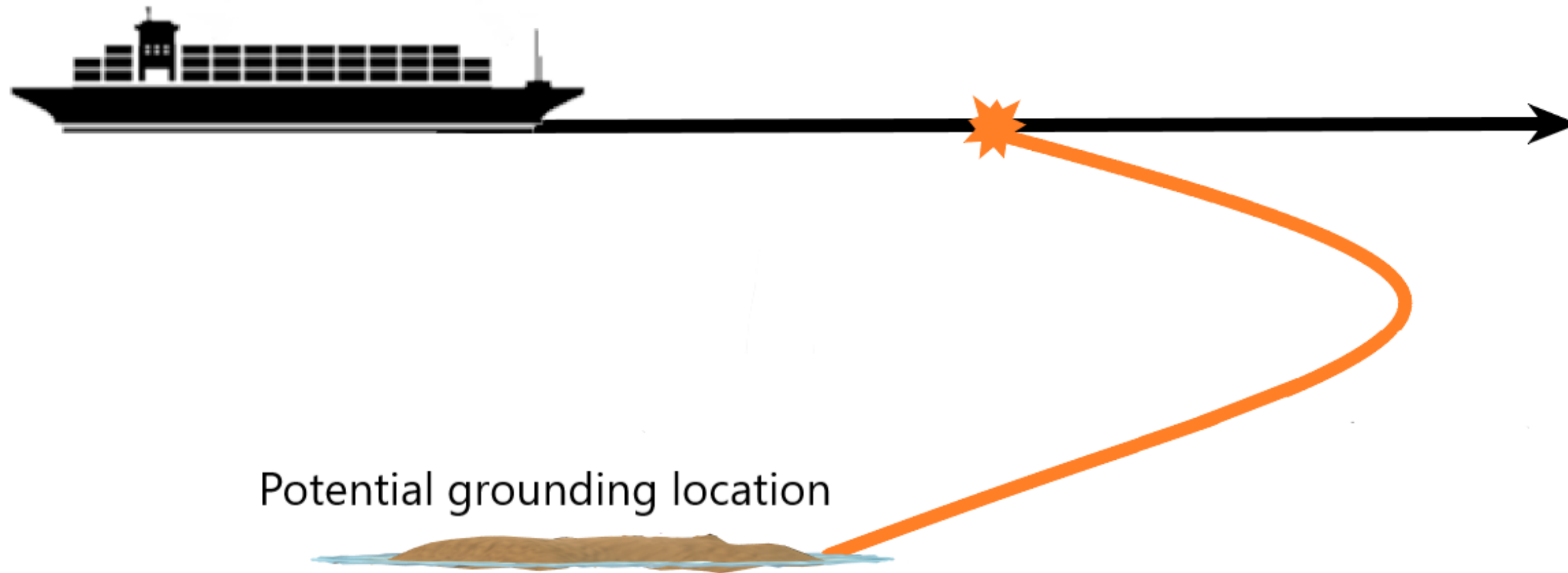


Rescue Towing Analysis Model



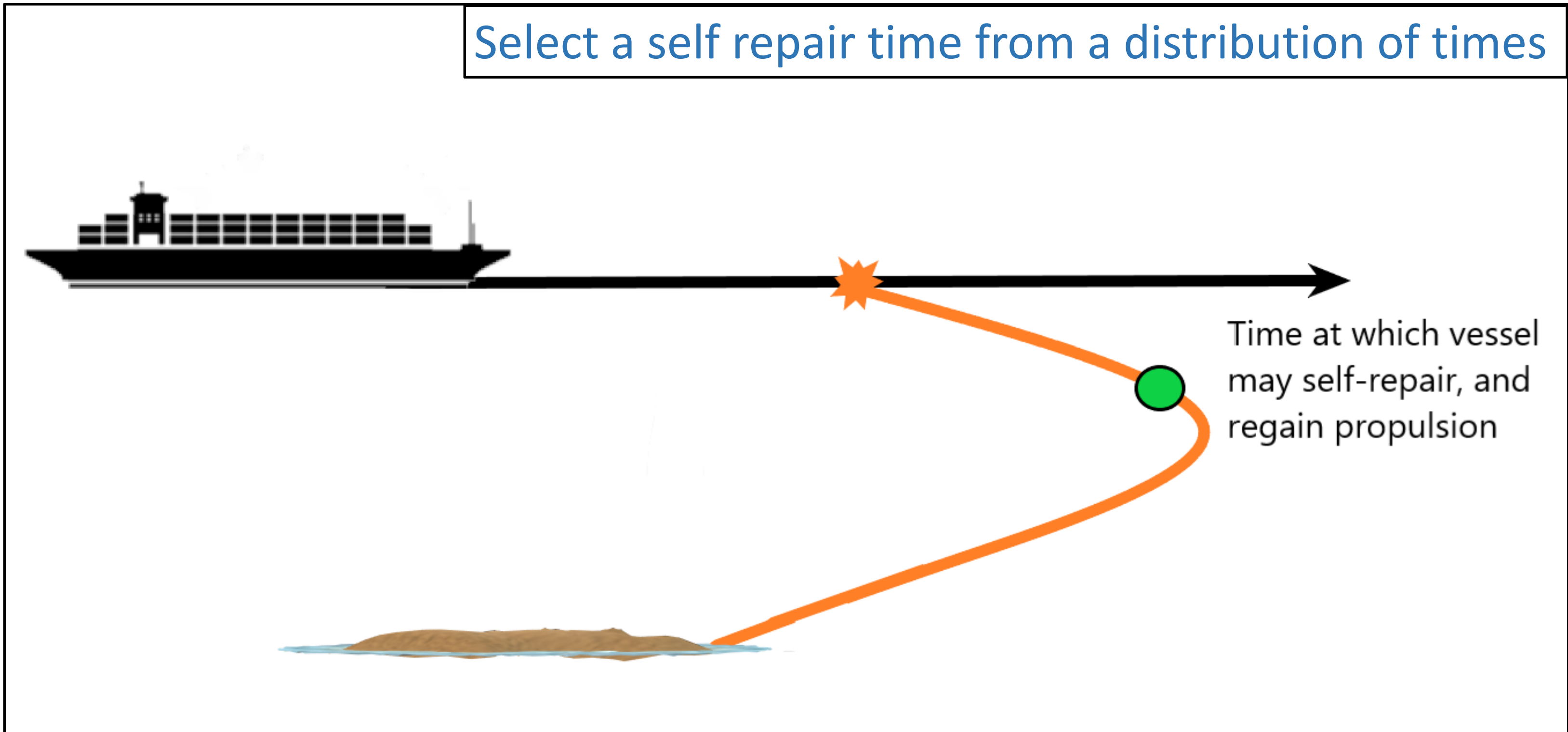
Rescue Towing Analysis Model

Estimate grounding location based on water depth and ship draft



Rescue Towing Analysis Model

Select a self repair time from a distribution of times



Rescue Towing Analysis Model

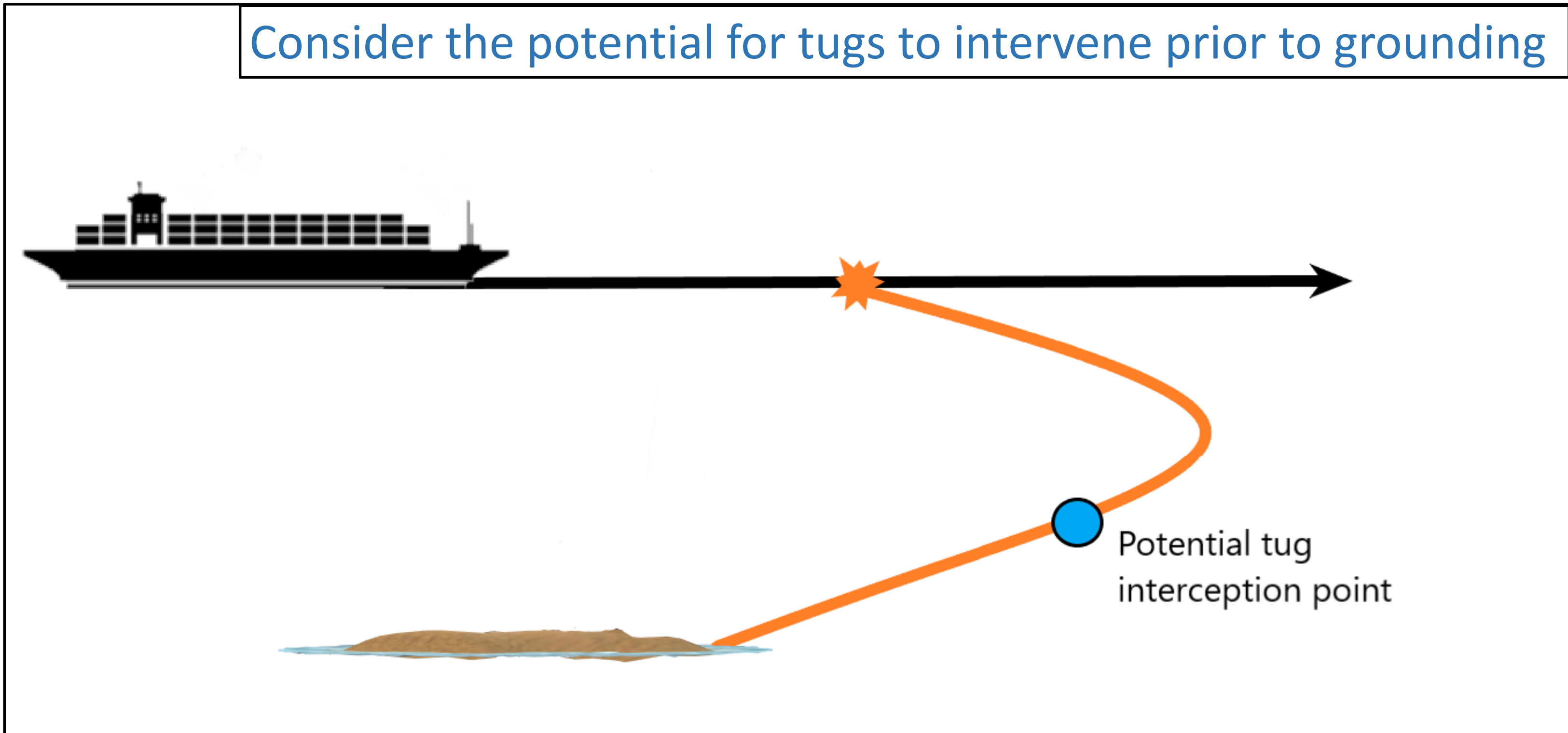
Evaluate potential to emergency anchor along the drift path



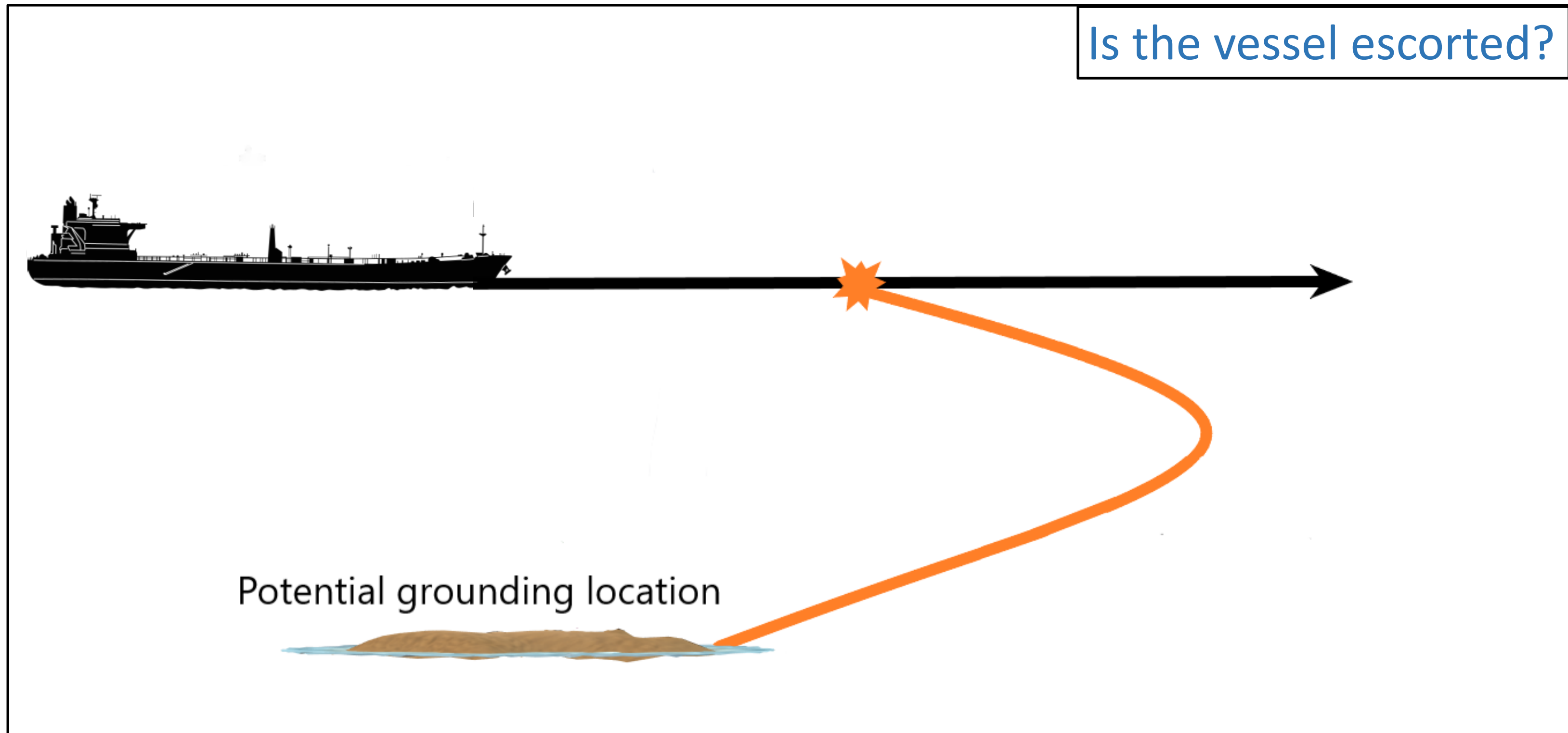
Point at which vessel
may be able to anchor

Rescue Towing Analysis Model

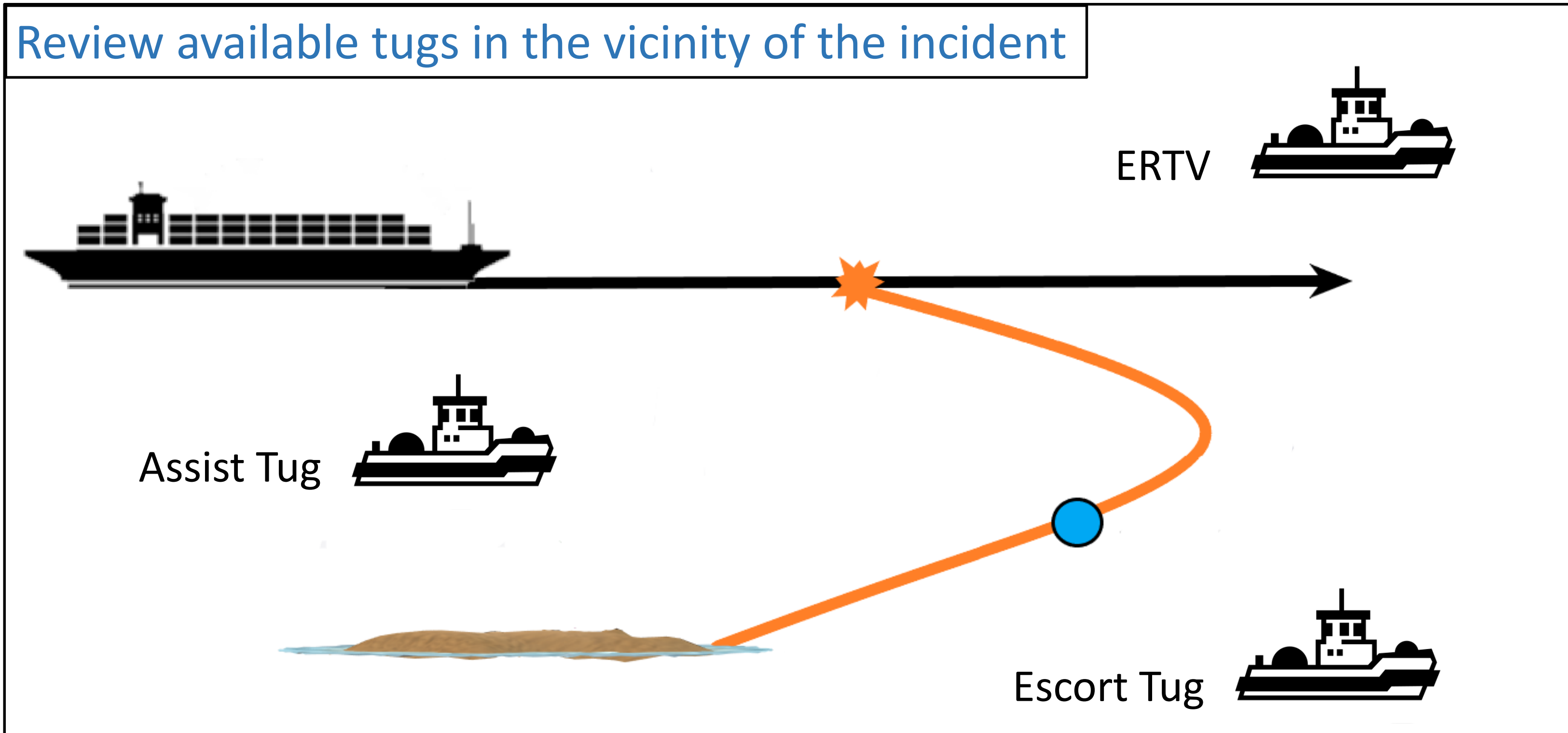
Consider the potential for tugs to intervene prior to grounding



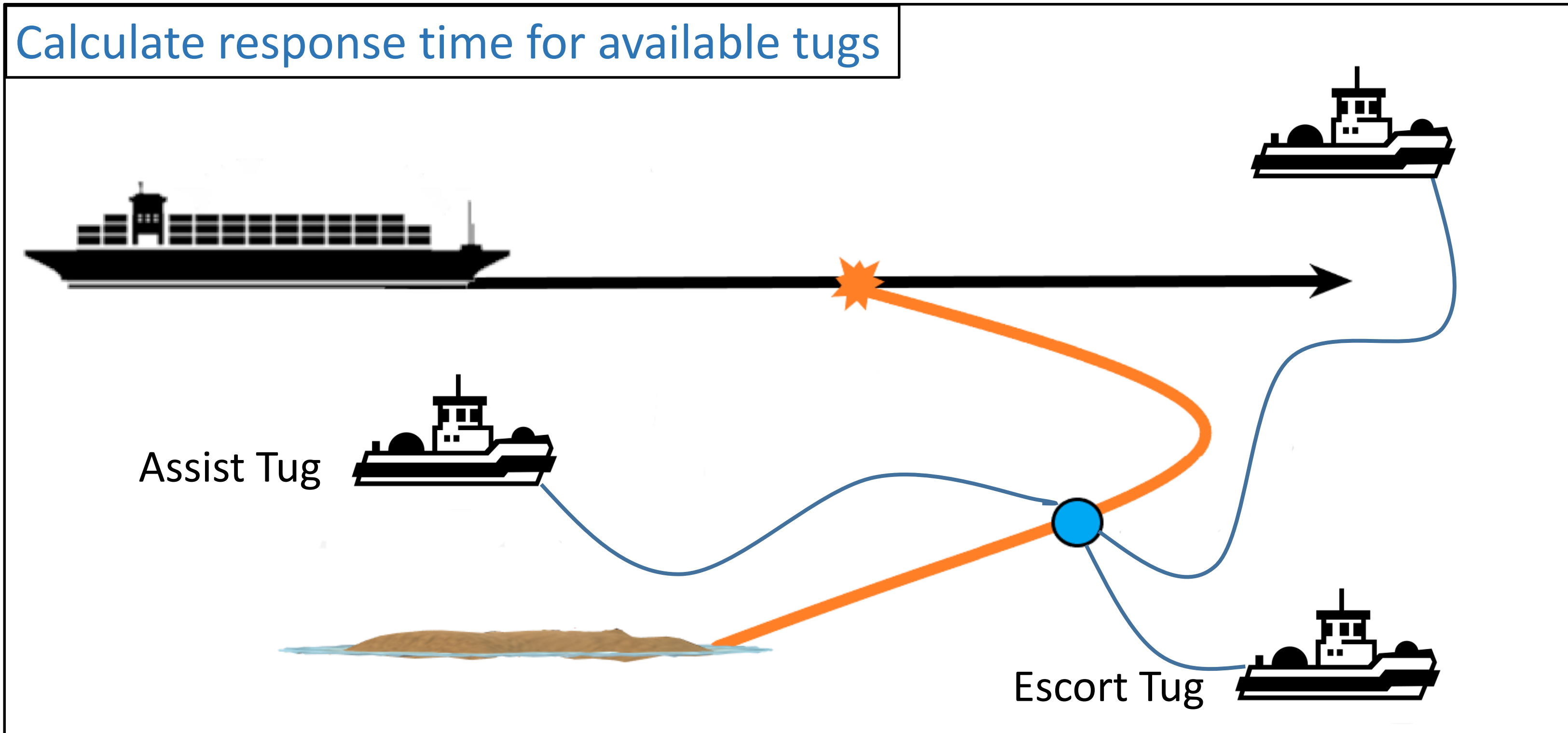
Rescue Towing Analysis Model



Rescue Towing Analysis Model



Rescue Towing Analysis Model



Analysis Approach

Loss of Propulsion Events

- Drift paths

Potential Internal Interventions

- Initial Turn
- Self Repair
- Anchoring

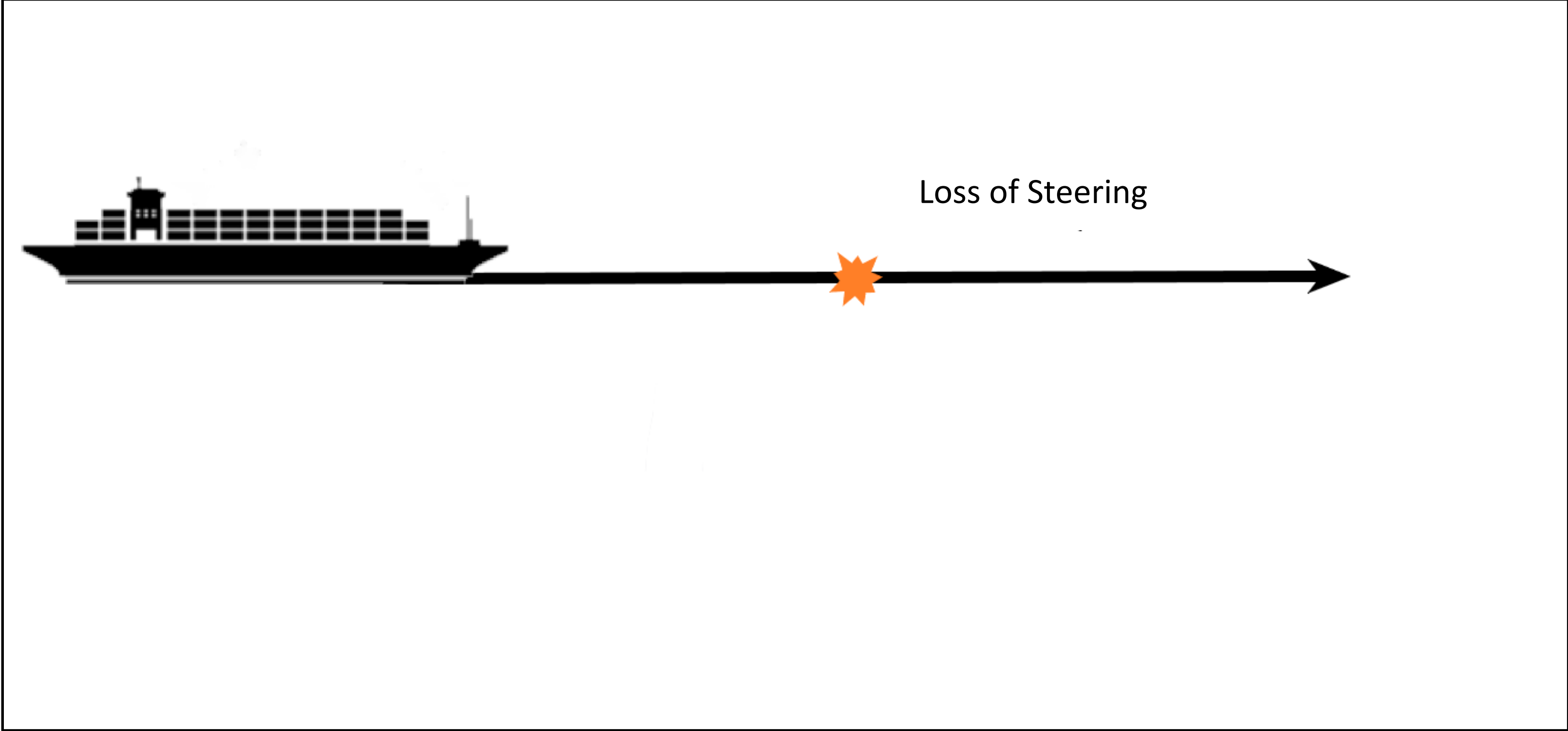
Potential External Interventions

- Tug Response

Image: <https://gcaptain.com/the-amazing-race-to-save-the-modern-express-in-photos/>



Rescue Towing Analysis Model



Inputs and Assumptions

1. Loss of Propulsion Probabilities

- Based on loss of propulsion reports in the local area from 2002-2019

2. Self Repair Distribution

- Based on a review of 98 reports detailing what happened after a local loss of propulsion event

3. Emergency Anchoring Potential

- Ships must be under 3 knots, at least 500m plus own length from hazards

4. Momentum and Drift Parameters

- Ships drift at max draft & displacement, using historical weather for the location

5. Escort/Assist Tug Dispatching

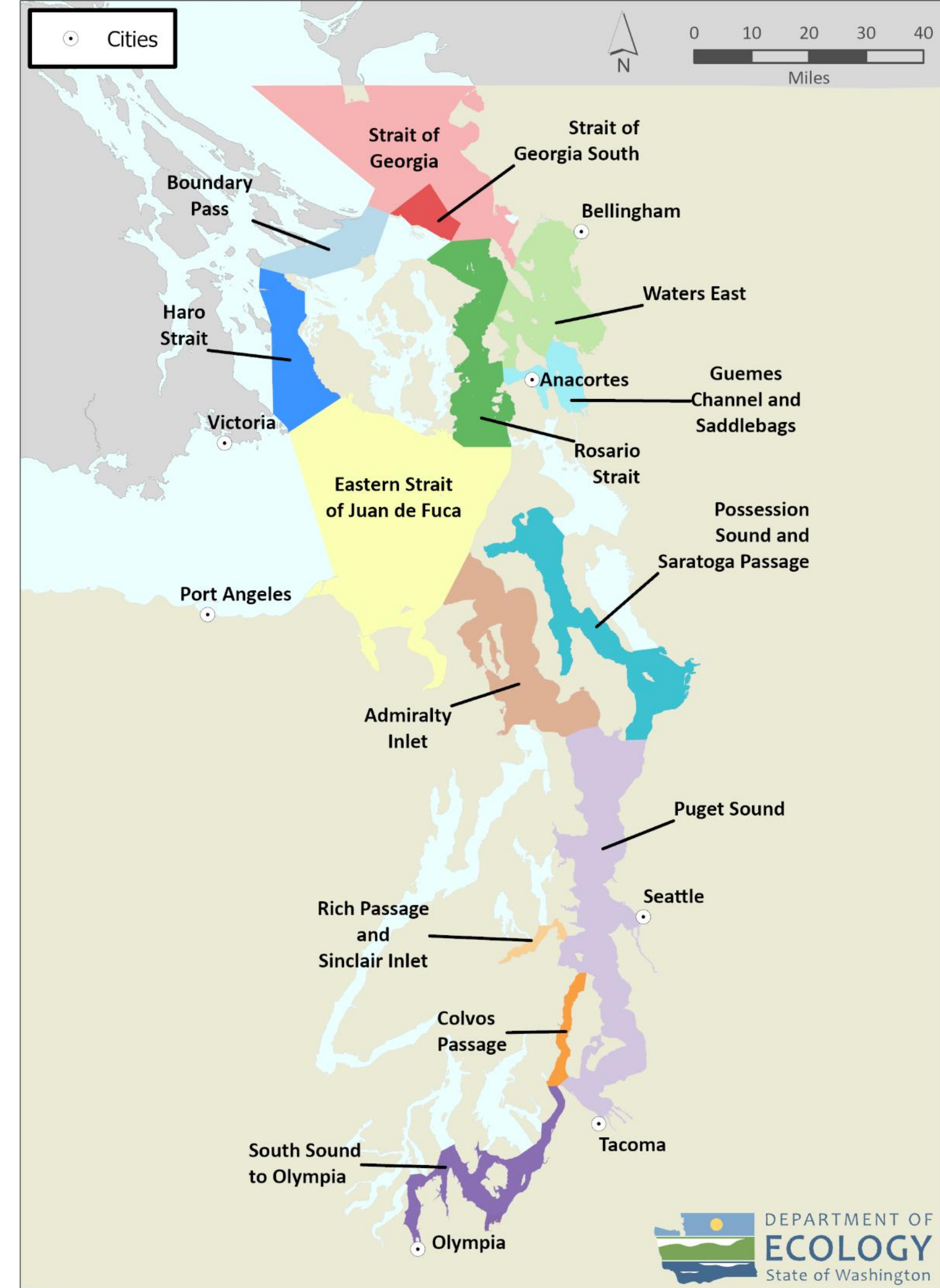
- Escorts and assists dispatched based on historical transits to and from rendezvous locations

6. Ladenness of Tank Vessels

- Ladenness is assigned based on whether observed transits were escorted or not, and additional assumptions

Tug Escort Scenarios

1. Pre-2020 requirements
2. Current requirements
3. Escorts Required Throughout Study Area



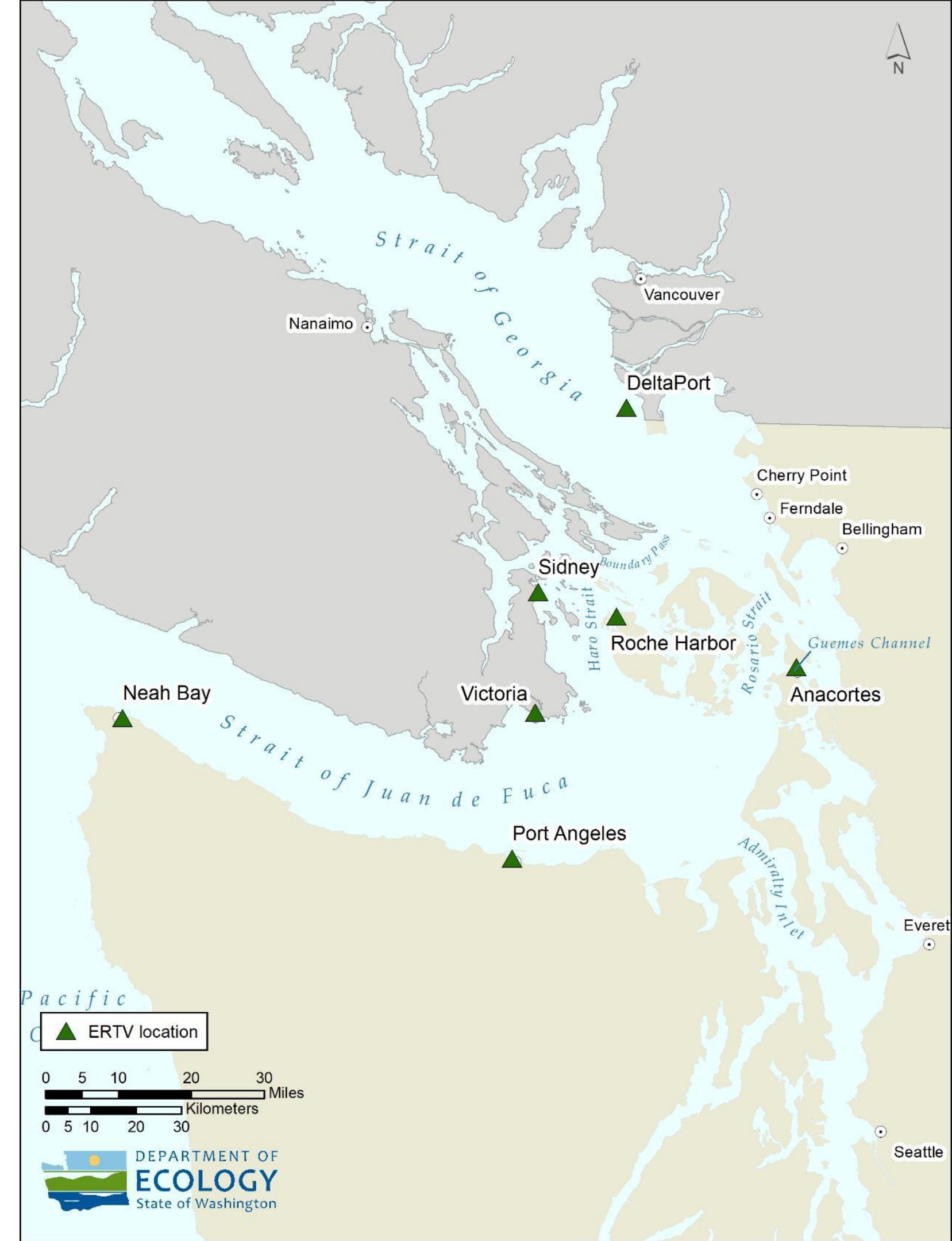
ERTV Scenarios

Same Tug Escort Scenarios

- Pre-2020 requirements
- Current requirements
- Escorts required throughout study area

Potential ERTV Locations

- Port Angeles, WA
- Victoria, BC
- Anacortes, WA
- Roche Harbor, WA
- Sidney, BC
- Deltaport, BC



Risk Metrics

Drift Grounding Count

- A count of the number of times a vessel drifts aground following a loss of propulsion

Oil Outflow

- An estimate based on historical outflow amounts from US/Canada incidents and differentiated by vessel type
 - Based on an empirical distribution of historical amounts
 - Capped at maximum fuel/cargo capacity of vessel

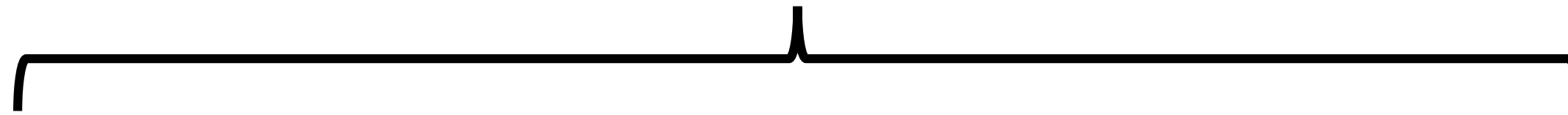
Oil Volume at Risk

- The maximum potential volume of oil onboard vessels that drift aground in the model
 - Maximum fuel capacity
 - Maximum cargo capacity (if laden)



Key Model Outputs

For Each Loss of Propulsion Event



With Initial Turn Included

- Self-repair time
- Drift to ground time
- Emergency anchoring
- ERTV response time
- Escort response time
- Tug of opportunity response time
- Drift grounding event
- Oil volume at risk
- Oil outflow

Without Initial Turn Included

- Self-repair time
- Drift to ground time
- Emergency anchoring
- ERTV response time
- Escort response time
- Tug of opportunity response time
- Drift grounding event
- Oil volume at risk
- Oil outflow



Additional Topics for Analysis Report

Risk from Increased Tug Escort Traffic

- What level of spill risk do we see from historical tug traffic?
- How much additional tug traffic could we expect to see under each scenario?

Escorts for Trans Mountain Expansion Project (TMEP)

- Does drift grounding risk change when projected TMEP tank ship and escort traffic is included?

Key design characteristics of emergency towing vessels

- To be answered by literature review and examination of escort systems and case studies.

Drift Grounding in Context

- An examination of the relative frequency of drift groundings
- Using historical records in the MISLE and MARSIS databases



Model Uncertainty

Model outputs will contain uncertainty from many sources

- From data
- From processing
- From our assumptions

Scenario based approach helps control for some uncertainty

- Outputs are best suited for evaluation of relative changes

Assumptions should be evaluated in this context

- They are necessarily simplifications

Request for Input

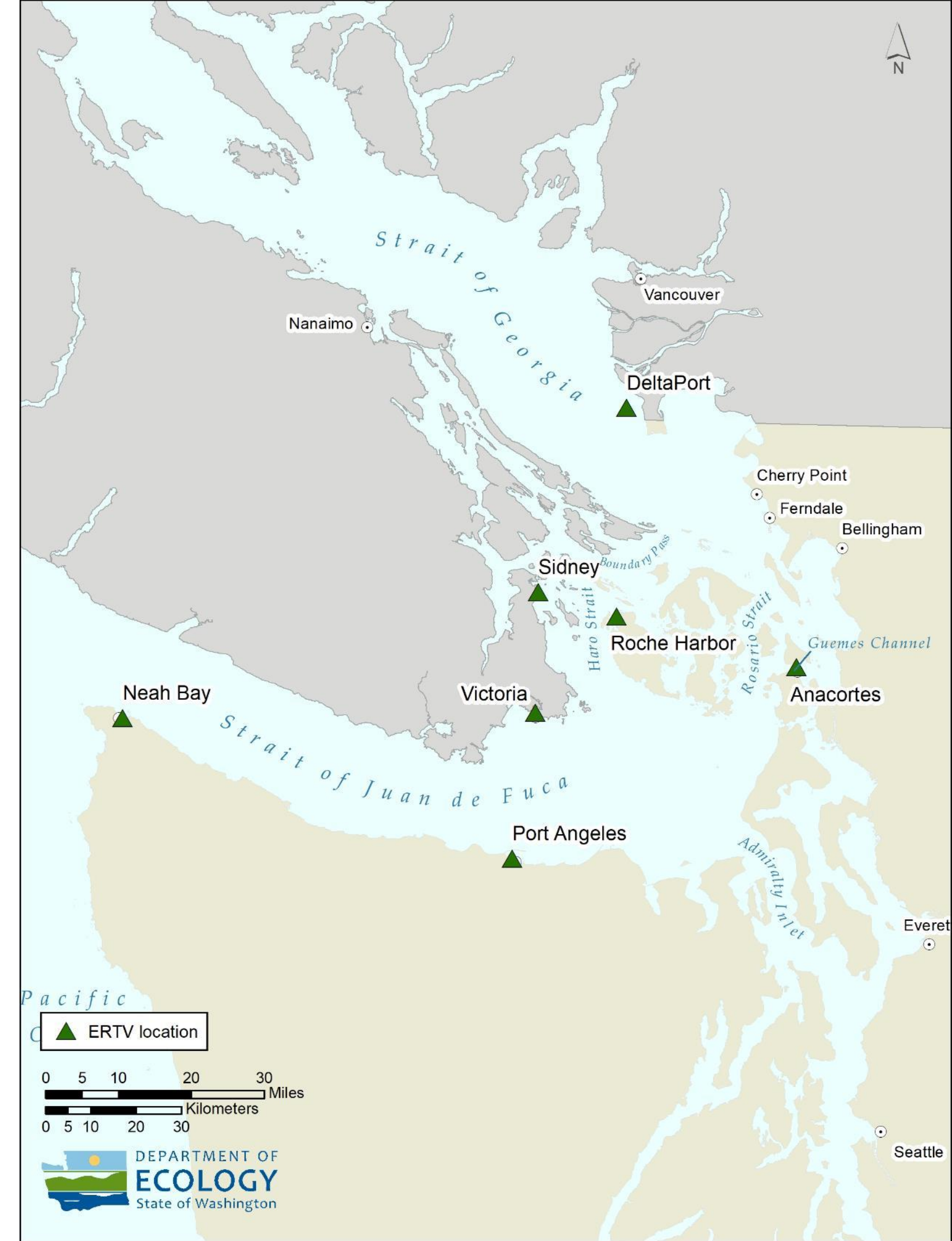


- **ERTV Locations**
- **Tug Response Parameters**

ERTV Locations

We propose for evaluation 6 potential locations in addition to the Neah Bay ERTV:

- Port Angeles, WA
- Victoria, BC
- Anacortes, WA
- Roche Harbor, WA
- Sidney, BC
- Delta Port, BC



Tug Response Parameters

Response Parameter	Current Approach
Notification Time	Immediate
ERTV Mobilization Time	20 Minutes
Assist/Escort Tug Mobilization Time	Immediate
Tug Average Response Speed	10 knots
Time to Connect	15 minutes
Time to Control	15 minutes



Next Steps and Upcoming events



Webinar: Final Model Analysis Plan

- July 13th, 2022 -- 10 am to 12 pm

Initial Model Runs

- July - August 2022

Webinar: Preliminary Outputs

- Winter 2023

Report Due to Legislature, September 2023



Today's discussion topics

- Input on ERTV Locations
- Input on Tug Response Parameters
- And feedback on model structure and assumptions



Contact Info

JD Ross Leahy

Maritime Risk Modeling Specialist
Prevention Section

Spill Prevention, Preparedness, and
Response Program

jd.leahy@ecy.wa.gov

Work Cell: 425-410-9806



Discussion logistics

The screenshot displays the GoToWebinar control panel. At the top, there is a menu with 'File', 'View', and 'Help'. Below this is the 'Audio' section, which includes a 'Sound Check' indicator with a green bar and a question mark. Two radio buttons are present: 'Computer audio' (selected) and 'Phone call'. A microphone icon is shown with the word 'MUTED' in red. Below this, a dropdown menu shows 'Transmit (Plantronics Savi 7xx-M)'. A volume slider is visible, and another dropdown menu shows 'Receive (Plantronics Savi 7xx-M)'. A status bar indicates 'Talking: Liz Davis'. Below the audio section is a 'Questions' section, which is highlighted with a red border. It contains a text input field with the placeholder text '[Enter a question for staff]' and a 'Send' button. At the bottom of the interface, the text 'Webinar Housekeeping' and 'Webinar ID: 608-865-371' is displayed, along with the GoToWebinar logo.