Rescue Towing Analysis Model
Tug Escort and ERTV Analyses

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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

<table>
<thead>
<tr>
<th>Evaluation of Tug Escorts</th>
<th>Evaluation of a Response Tug</th>
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<tbody>
<tr>
<td>“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”</td>
<td>“Quantitatively assess whether an emergency response towing vessel serving Haro Strait, Boundary Pass, Rosario Strait, and connected navigable waterways will reduce oil spill risk”</td>
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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

**Model Development**
Summer 2020 – Spring 2022

**Outreach and Model Runs**
Fall 2021 – Winter 2023

**Report Writing**
Spring 2023 – Summer 2023

- **Comment Period for Scopes of Work**
  September 1-30, 2021

- **Webinar: Tug Escort and ERTV Analyses**
  June 8\textsuperscript{th}, 2022 -- 10 am to 12 pm

- **Webinar: Final Model Analysis Plan**
  July 13\textsuperscript{th}, 2022 -- 10 am to 12 pm

- **Webinar: Preliminary Outputs**
  Winter 2023

**Webinar: Final Model Analysis Plan**
July 13\textsuperscript{th}, 2022 -- 10 am to 12 pm
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

Ecology Lead
- Develop Model
- Report on ERTV Analysis
- Report on Tug Escort Analysis
Tug Escort Rulemaking

- Risk Model analysis is one of many considerations
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

Analysis Approach: The Rescue Towing Analysis Model

- **Vessel Movement**: Generates traffic levels, vessel routes, and movements.
- **Vessel Accident**: Uses probabilities to estimate loss of propulsion and loss of steering events.
- **Momentum and Drift**: Plots a drift path from moment of LOP to ground.
- **Vessel Rescue Tools**: Tests interventions to prevent drift groundings following loss of propulsion.
- **Oil Spill Risk Metrics**: Estimates number of drift groundings, volume of oil at risk, and estimated oil outflow.
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

Use momentum, weather forces and ship details to calculate drift.
Rescue Towing Analysis Model

Initial Turn
Rescue Towing Analysis Model

Plot drift path

Drift Path
Rescue Towing Analysis Model

Estimate grounding location based on water depth and ship draft

Potential grounding location
Rescue Towing Analysis Model

Select a self repair time from a distribution of times

Time at which vessel may self-repair, and regain propulsion
Rescue Towing Analysis Model

Evaluate potential to emergency anchor along the drift path

Point at which vessel may be able to anchor
Consider the potential for tugs to intervene prior to grounding.
Rescue Towing Analysis Model

Is the vessel escorted?

Potential grounding location

Oil Tanker by usubaliev from NounProject.com
Rescue Towing Analysis Model

Review available tugs in the vicinity of the incident

ERTV

Assist Tug

Escort Tug
Rescue Towing Analysis Model

Calculate response time for available tugs
Analysis Approach

Loss of Propulsion Events
• Drift paths

Potential Internal Interventions
• Initial Turn
• Self Repair
• Anchoring

Potential External Interventions
• Tug Response

Rescue Towing Analysis Model

Loss of Steering
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

<table>
<thead>
<tr>
<th>Response Parameter</th>
<th>Current Approach</th>
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<tr>
<td>Notification Time</td>
<td>Immediate</td>
</tr>
<tr>
<td>ERTV Mobilization Time</td>
<td>20 Minutes</td>
</tr>
<tr>
<td>Assist/Escort Tug Mobilization Time</td>
<td>Immediate</td>
</tr>
<tr>
<td>Tug Average Response Speed</td>
<td>10 knots</td>
</tr>
<tr>
<td>Time to Connect</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Time to Control</td>
<td>15 minutes</td>
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**Next Steps and Upcoming events**

**Webinar: Final Model Analysis Plan**
- July 13\(^{th}\), 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
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Discussion logistics