Focus on: Modeling Vessel Anchorages

Figure 1. A ship at anchor in Elliot Bay

Introduction

We're seeking your input on our approach to modeling vessel anchorage use and vessel movements while at anchor. This is part of our development of an oil spill risk model.

You can provide feedback on the approaches described here via email or at one of our virtual events. We are hosting a technical discussion on the topic of anchorages on July 14th, 2021, where you can provide feedback (register).

For more information about our overall approach to modeling oil spill risk, you can review our Modeling Approach focus sheet (link), and our Model Development Project webpage (link).

Selecting an Anchorage

The model assigns anchorages to vessels based on their navigational path through the system, and the historical anchorage selection rates of similar vessels. A map of model anchorages can be found here (link).

Anchorages in US waters tend to be capable of accommodating more than one vessel at a time, and as such are generally assigned a maximum capacity.

The model will not allow a vessel to anchor at a location that is already at maximum capacity.

If a simulated vessels track leads to an anchorage that is at capacity, the model will simulate a new track to a different nearby anchorage area. A list of anchorage locations and their alternates can be found here (link).

Staying At Anchor

Once a simulated vessel arrives at an anchorage, it must determine the time that it will stay at anchor and how it will move about while anchored.

Time at Anchor

The model assigns a length of stay to each anchored vessel. The duration of the length of stay is based on historical durations of vessels of same type, in the same anchorage.

Behavior at Anchor

Vessel movement while at anchor is based on historical AIS messages produced by similar vessels in similar areas. The model assigns a set of historical messages to each anchored vessel.

The movements will not be linked to simulated conditions such as tides or currents, but they will be representative of anchor swing circles exhibited by similar vessels in the past.

Incidents at Anchor

Our oil spill risk model simulates vessel movements to estimate the occurrence of incidents with potential for oil spills. There are a variety of incidents that are linked to vessels at anchor.

Collisions

The model uses encounter criteria to evaluate interactions between anchored vessels and underway vessels. You can read more about the encounter module here (link).

If an encounter is identified, the model evaluates the potential for collision. Whether a collision happens or not is calculated using a probability.

Dragging Anchor

The model will simulate the potential for anchored vessels to drag anchor. If a simulated vessel drags anchor it will have the potential to suffer a collision with another vessel or a grounding.

How to Provide Feedback

We welcome feedback on this topic at our upcoming technical discussion session as well as in writing. All feedback is welcome, but you may find the following questions helpful in guiding your comments:

- Are there others aspects of modeling anchoring that you want to see included in the model?
- Are there additional data sources you would suggest we investigate as part of this work?
- What concerns do you have with modeling vessels and anchorages in this way?

Contact information

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ADA accessibility

To request an ADA accommodation, contact Ecology by phone at 360-407-6831 or email at ecyadacoordinator@ecy.wa.gov, or visit https://ecology.wa.gov/accessibility. For Relay Service or TTY call 711 or 877-833-6341.