



Apr 27th, 11:30 AM - 1:00 PM

A statistical representation of oil spill fate in the Salish Sea based on AIS ship traffic, oil transfer data, and a Monte Carlo model framework.

Dr. Rachael Mueller

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A statistical representation of oil spill fate in the Salish Sea.

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1. University of British Columbia, 2. Dalhousie University

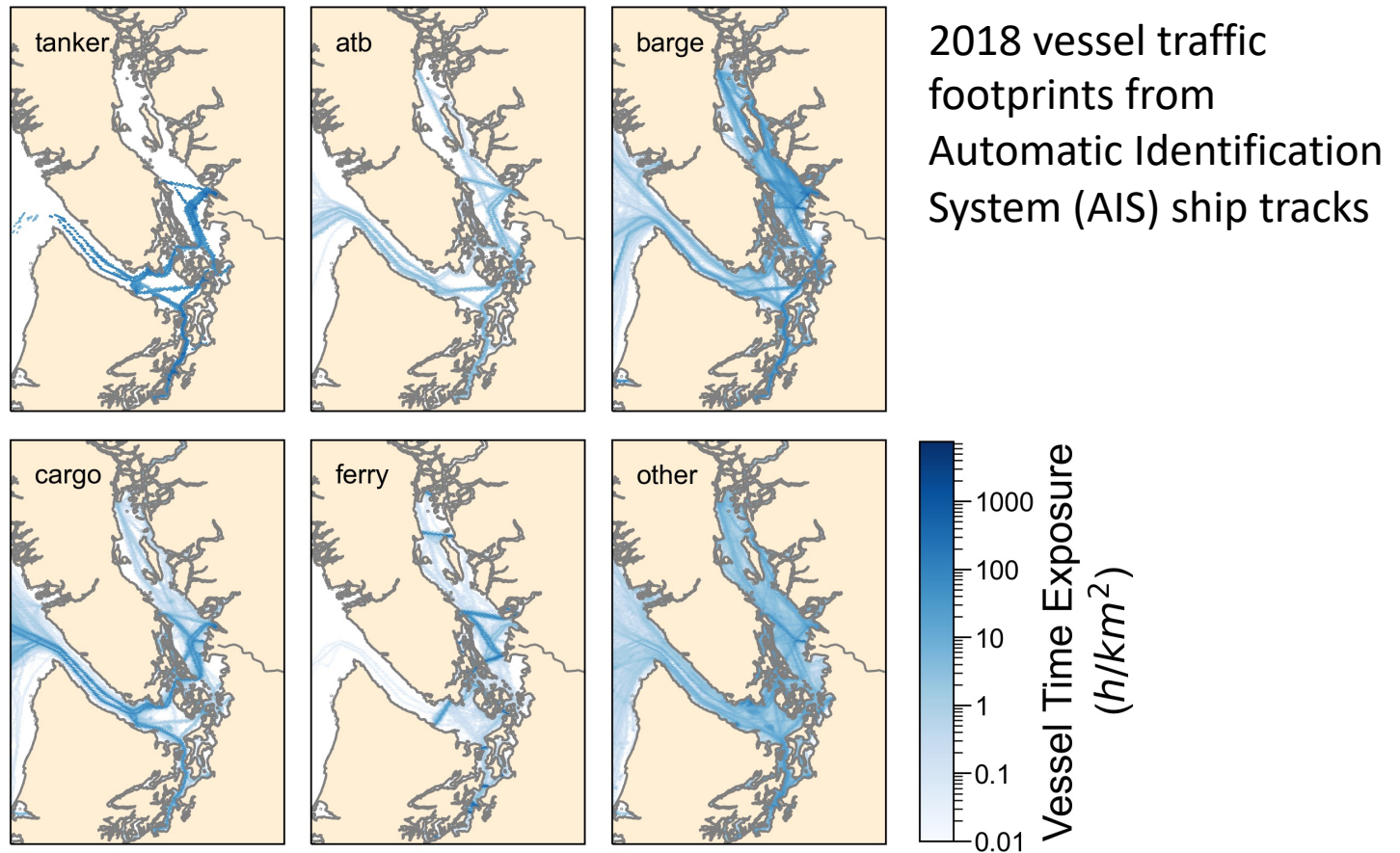


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The Salish Sea: A transportation HUB

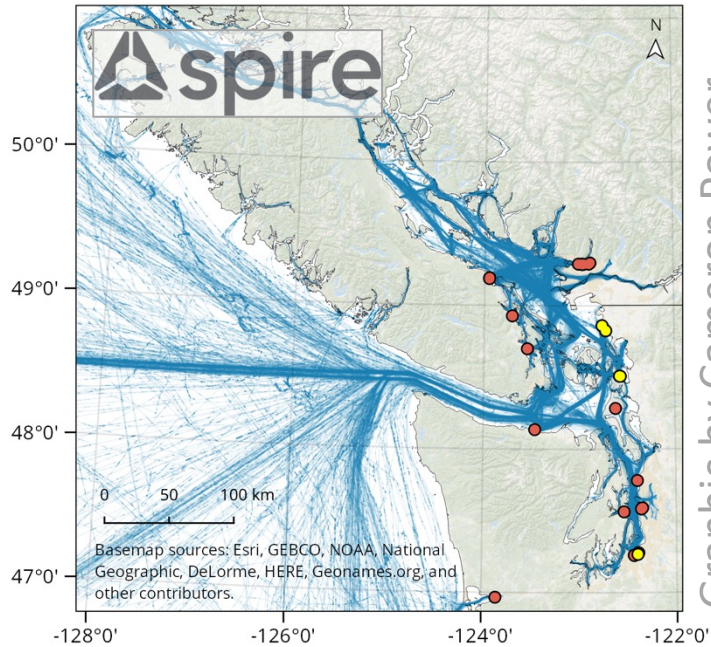




What are the spatial characteristics of oil spill fate in the Salish Sea?

This project: Moving beyond a single spill scenario toward maps of likelihood

2018 ship tracks



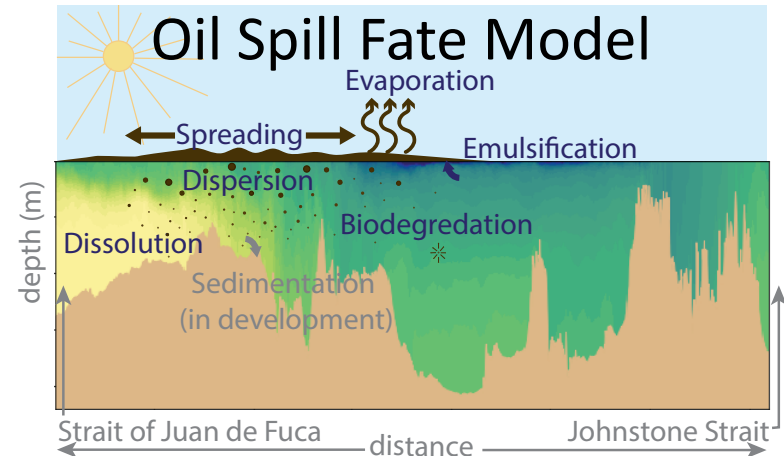
- Refineries
- Oil transfer terminals

2018 oil transfer data



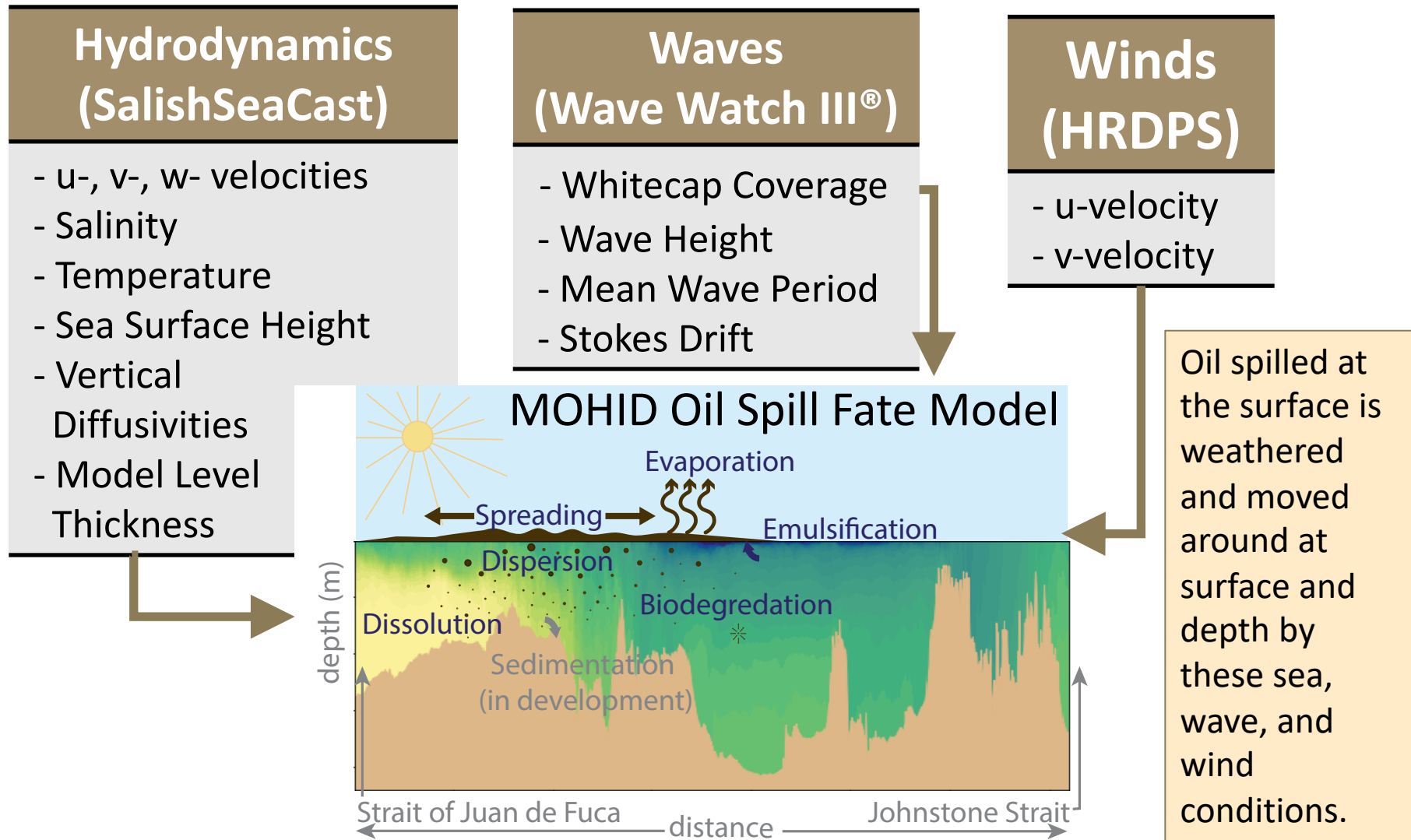
oil types →

MOHID + SalishSeaCast



Bedford Inst. of Oceanography
wave tank tour
by Brian Robinson

MOHID & SalishSeaCast modeling platform



Generating 10,000 statistic-based spills and spill volumes

Time:

Choose the month, weighted by VTE, choose the date/time uniformly

Location:

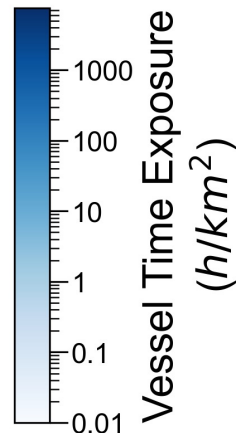
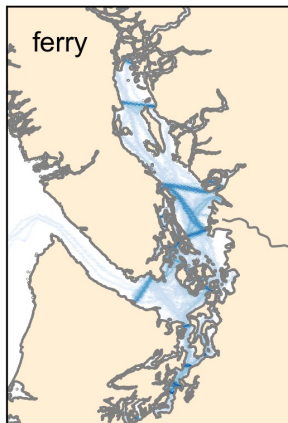
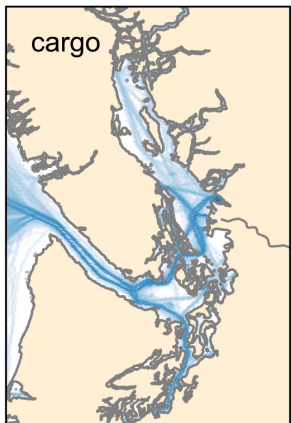
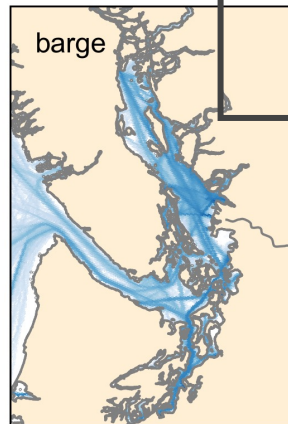
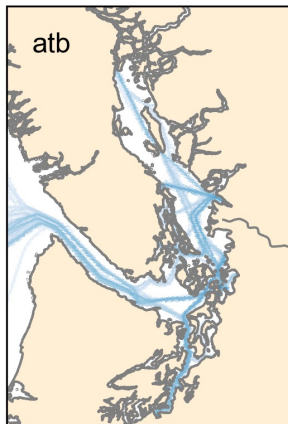
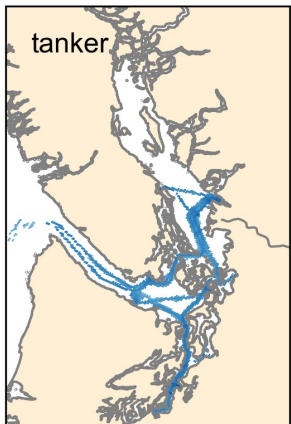
Choose the lat/lon grid box weighted by spatial distribution of VTE for that month, choose specific lat/lon uniformly

Vessel Type:

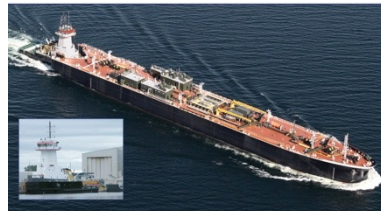
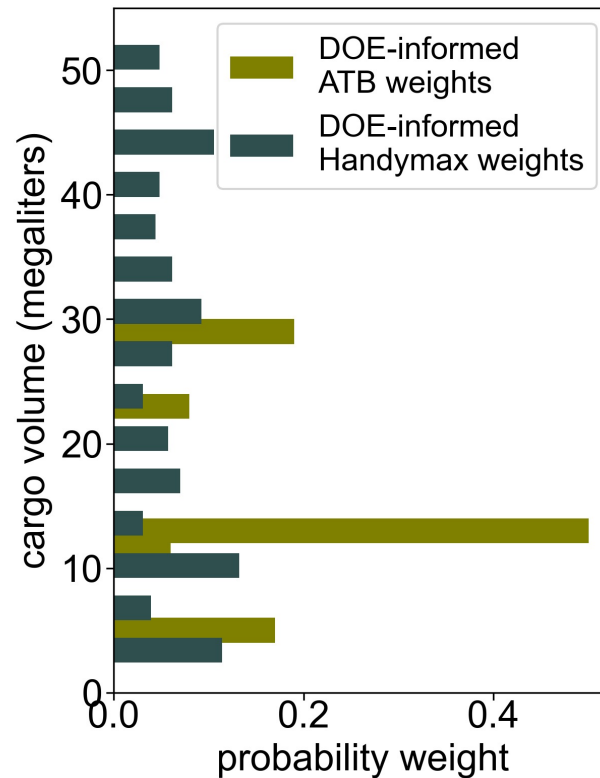
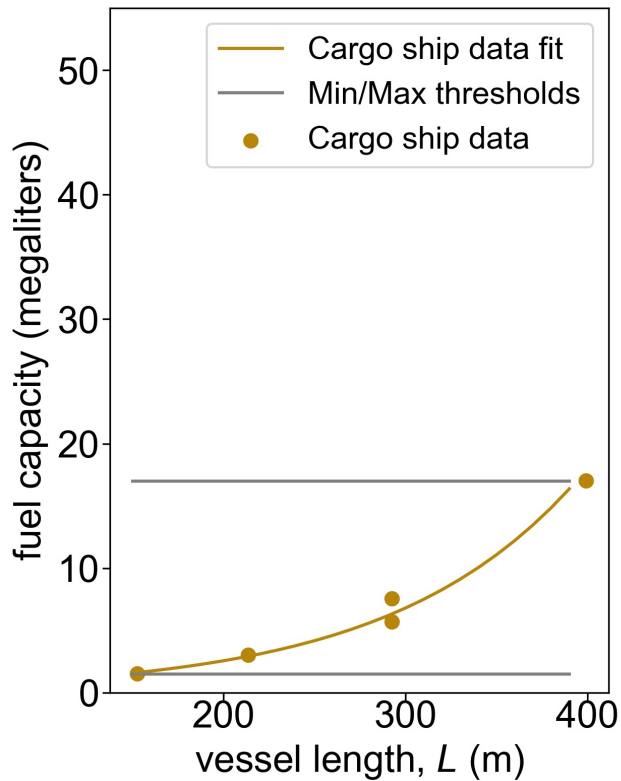
Choose vessel type weighted by VTE for that month in that grid box

Vessel Length:

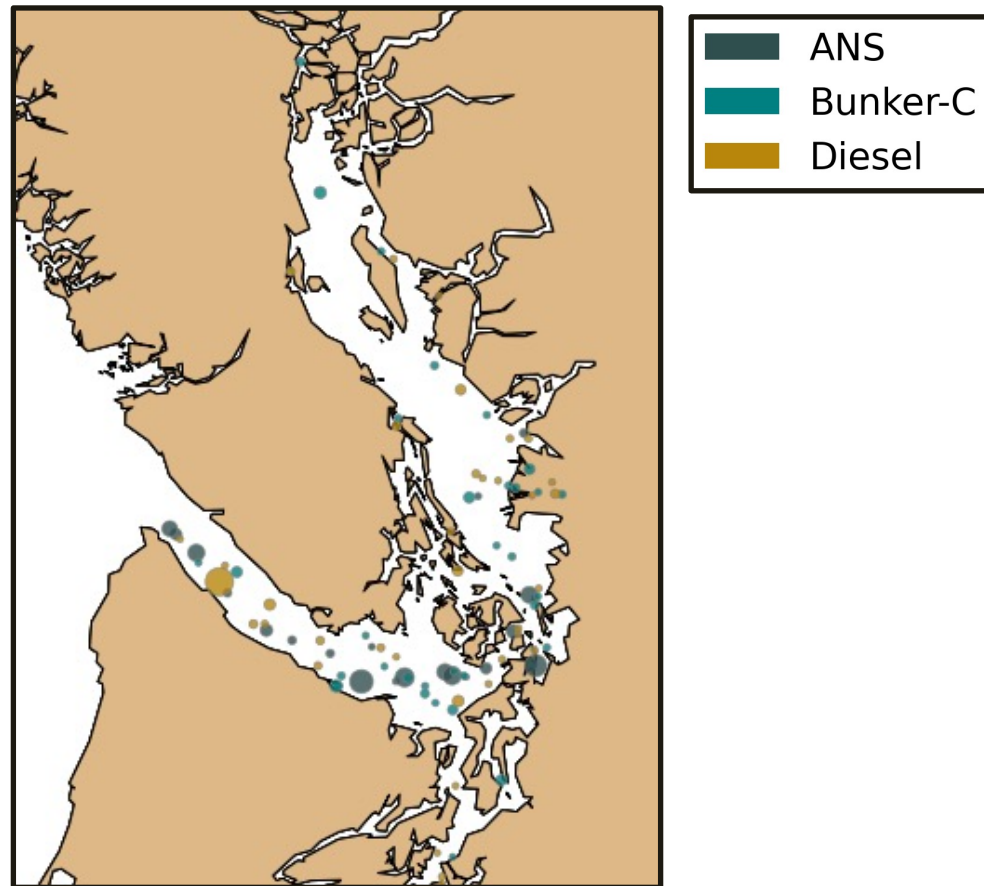
Choose a vessel track weighted by VTE for that month, in that grid box, for that vessel type.



Container ship fuel capacities vs. ATB and Handymax oil cargo capacities



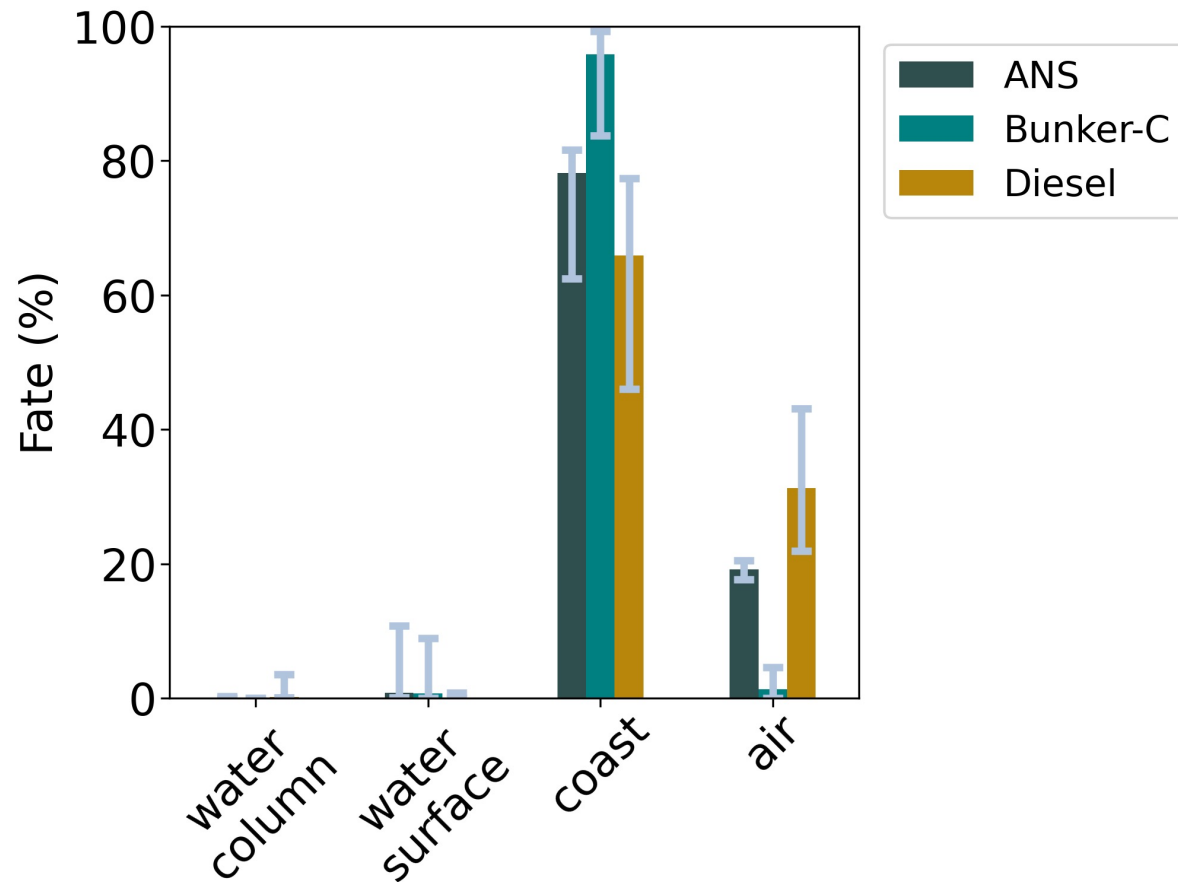
Distribution of the 100 largest spills in the 10,000 spills presented in this talk



Questions to be addressed

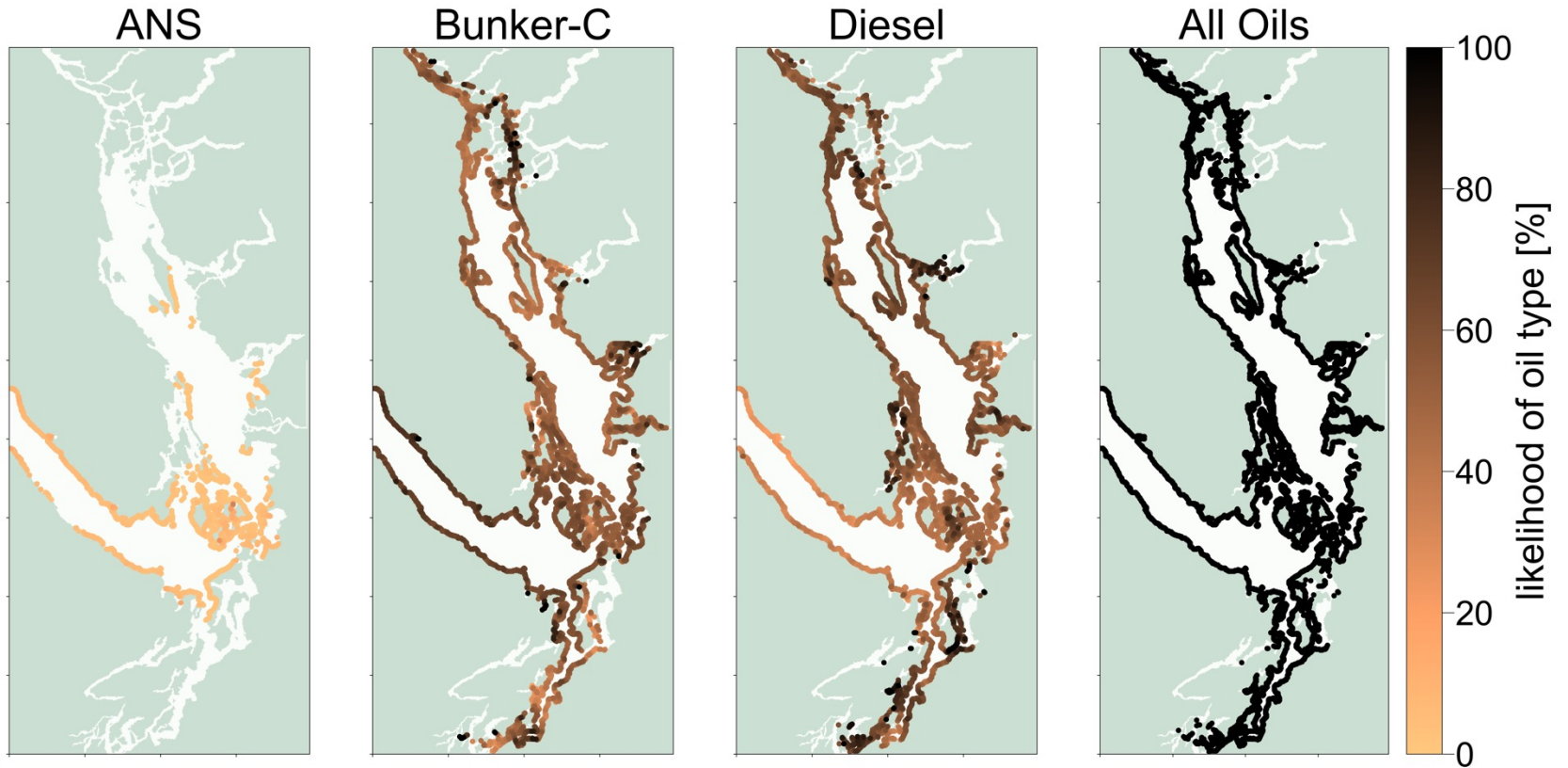
- Where is oil most likely to end up?
 - Evaluate 1D mass balance result for general characteristics
 - Evaluate 3D results for a regional view based on oil types
- Where is there a greater risk of larger volumes?
 - Evaluate 3D results for a regional view based on oil types

Oil fate fraction (from 1D results)



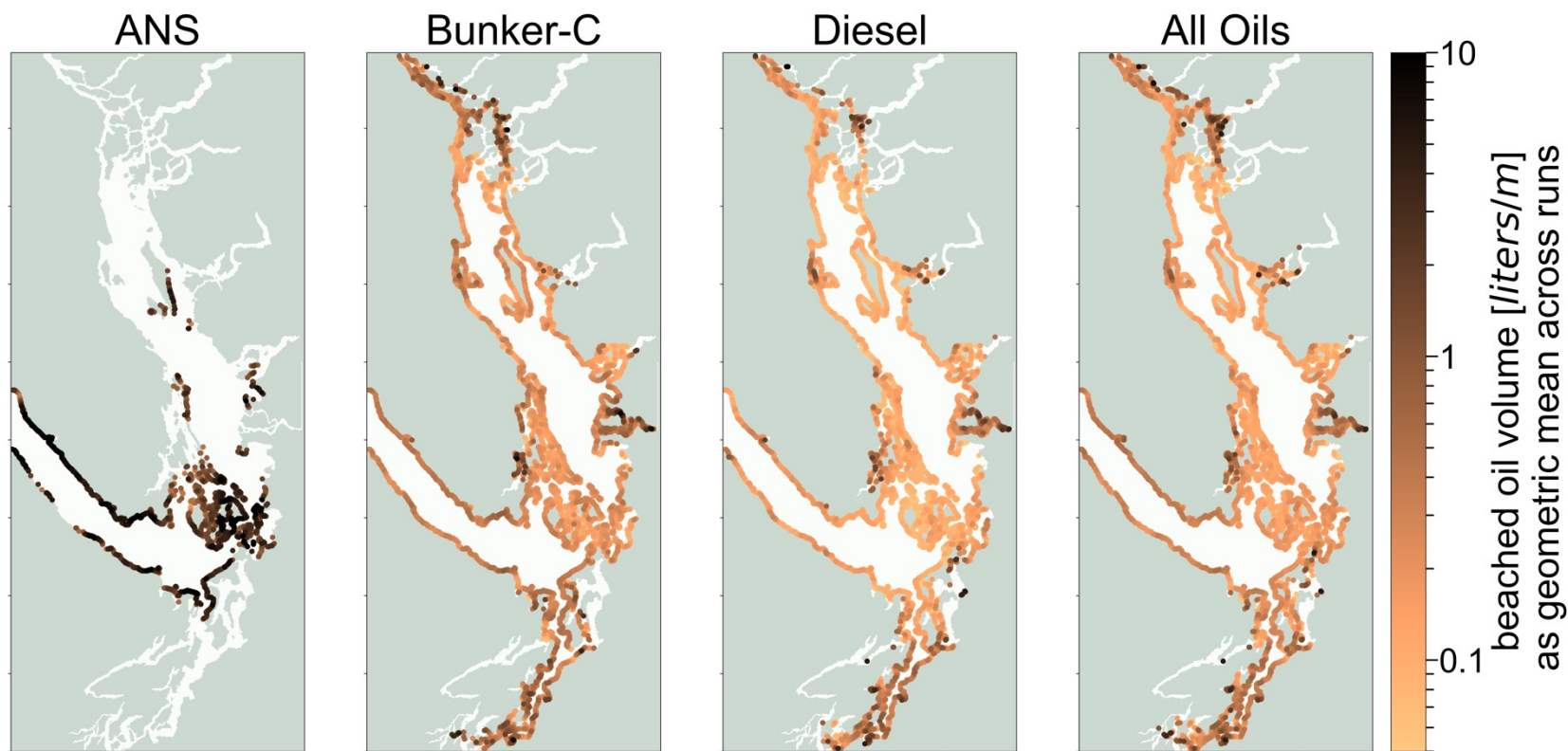
Water Column, Surface, Coast, Air

Likelihood of oil type on coastlines



Coast

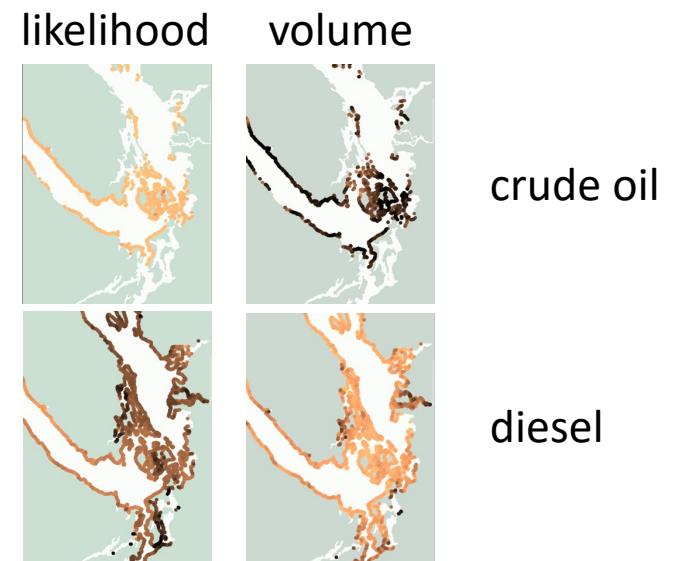
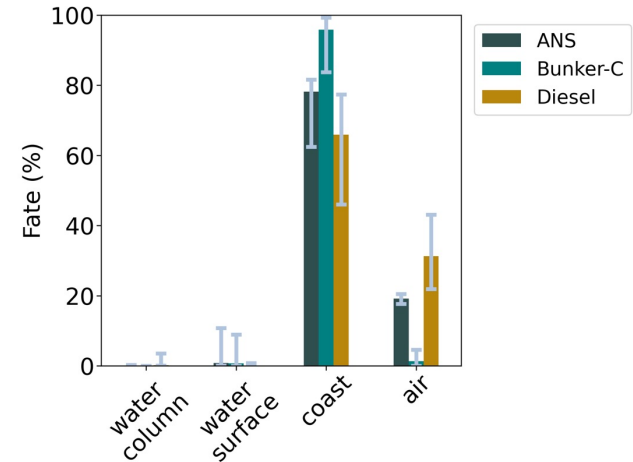
Oil volume along coastline



Coast

Take-aways

- Most oil goes to the coast
- Crude oil is the least likely to spill but has the greatest impact volume
- Likelihood of oil type varies by region



Special thanks to:



Ian Willms Photography

www.IanWillms.com



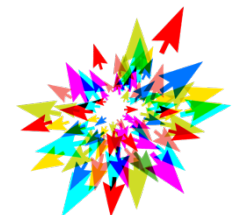
Alan Niles Photography

www.AlanNiles.com

Acknowledgements:



- MEOPAR, Compute Canada, University of British Columbia, Susan Allen, Spire Maritime, WA State Department of Ecology, Ocean Networks Canada, Charlie Costanzo, Bikramjit Kanjilal, Ross McDonald, Robert Allan, Iain Braidwood, and the MOAD research group, inclusive of Rebecca Beutel, Tereza Jarnikova, Raisha Lovindeer, Jose Valentí Muelas, Elise Olson, Birgit Rogalla, Karyn Suchy, and co-authors!



A question for Coast Salish communities:

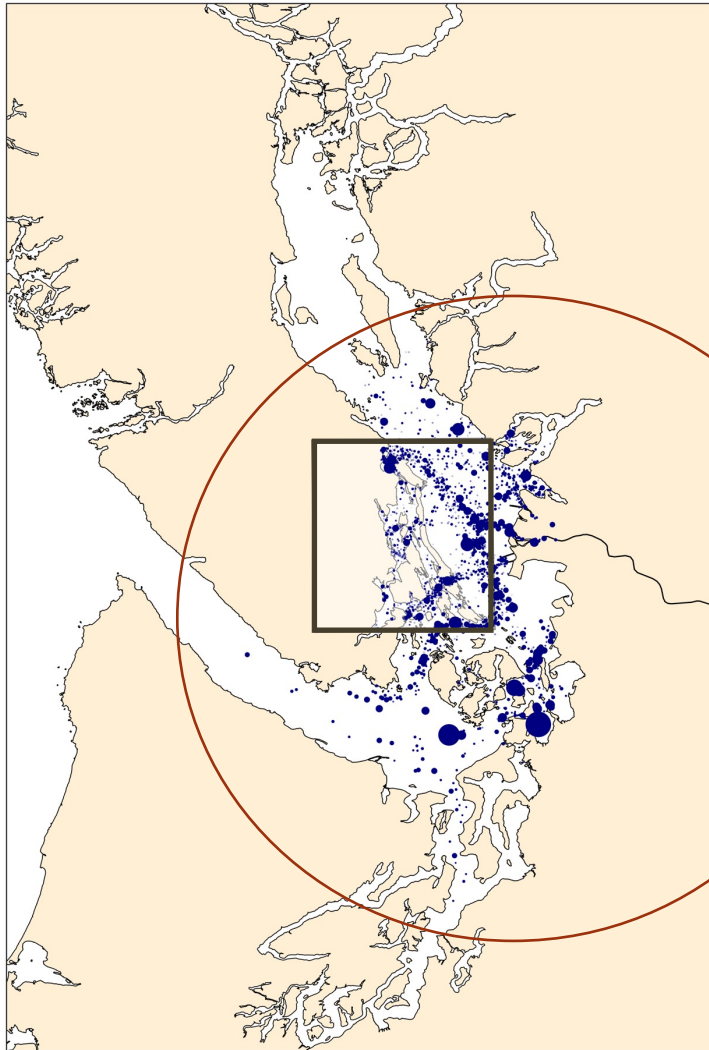
We have this information.

What would you like us to do with
this knowledge?

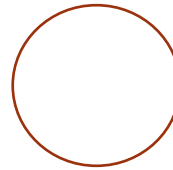
rmueller@eoas.ubc.ca

Thank you

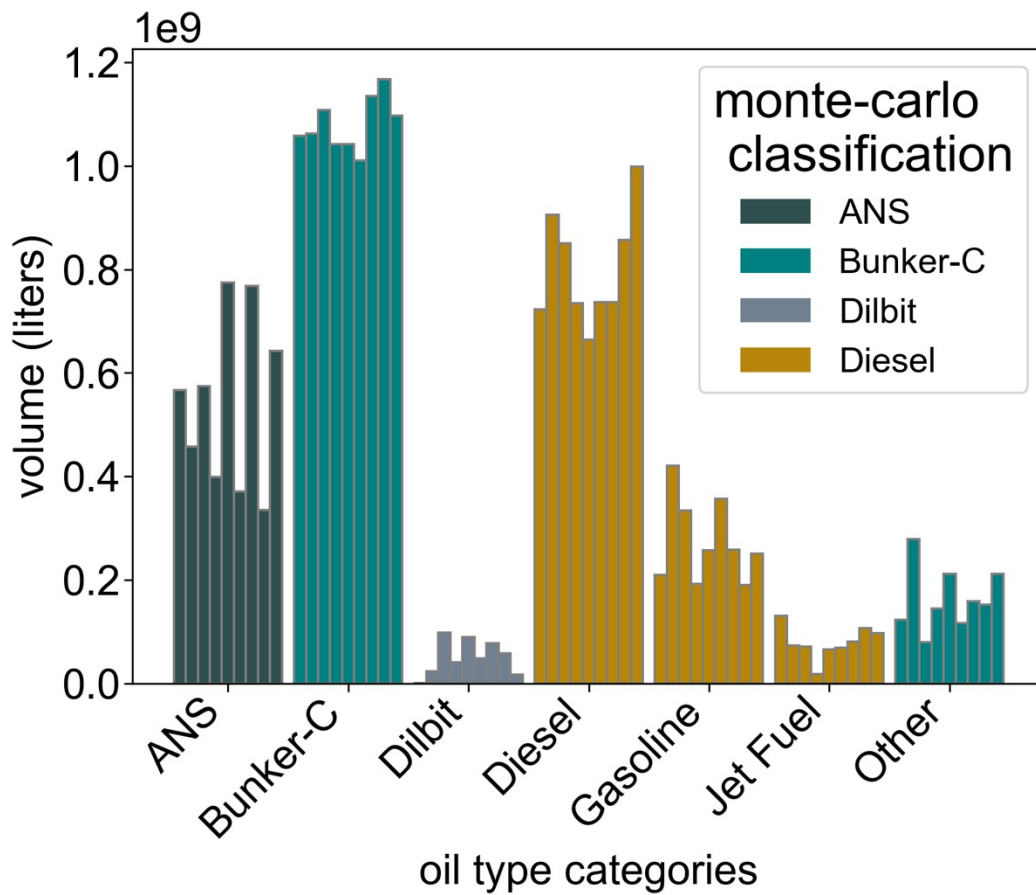
Preliminary evaluation of spill sources for specific regions of coastal impact



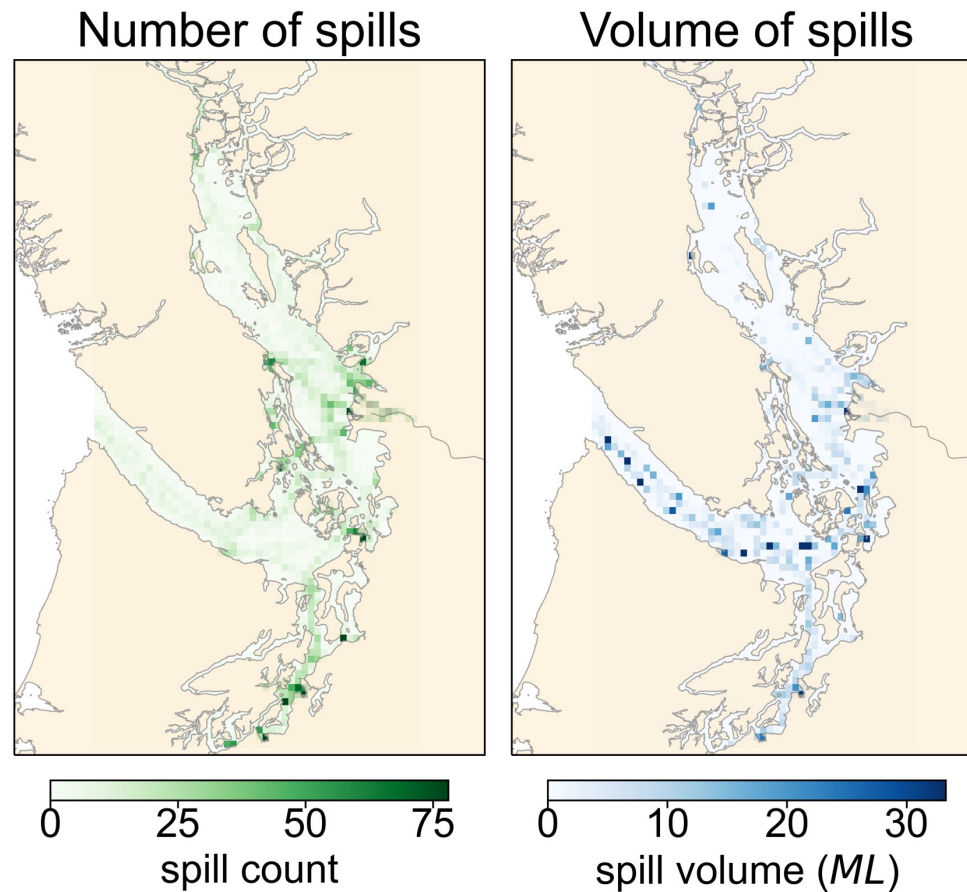
Selected area for demonstrating the reach of spill sources for coastal impact



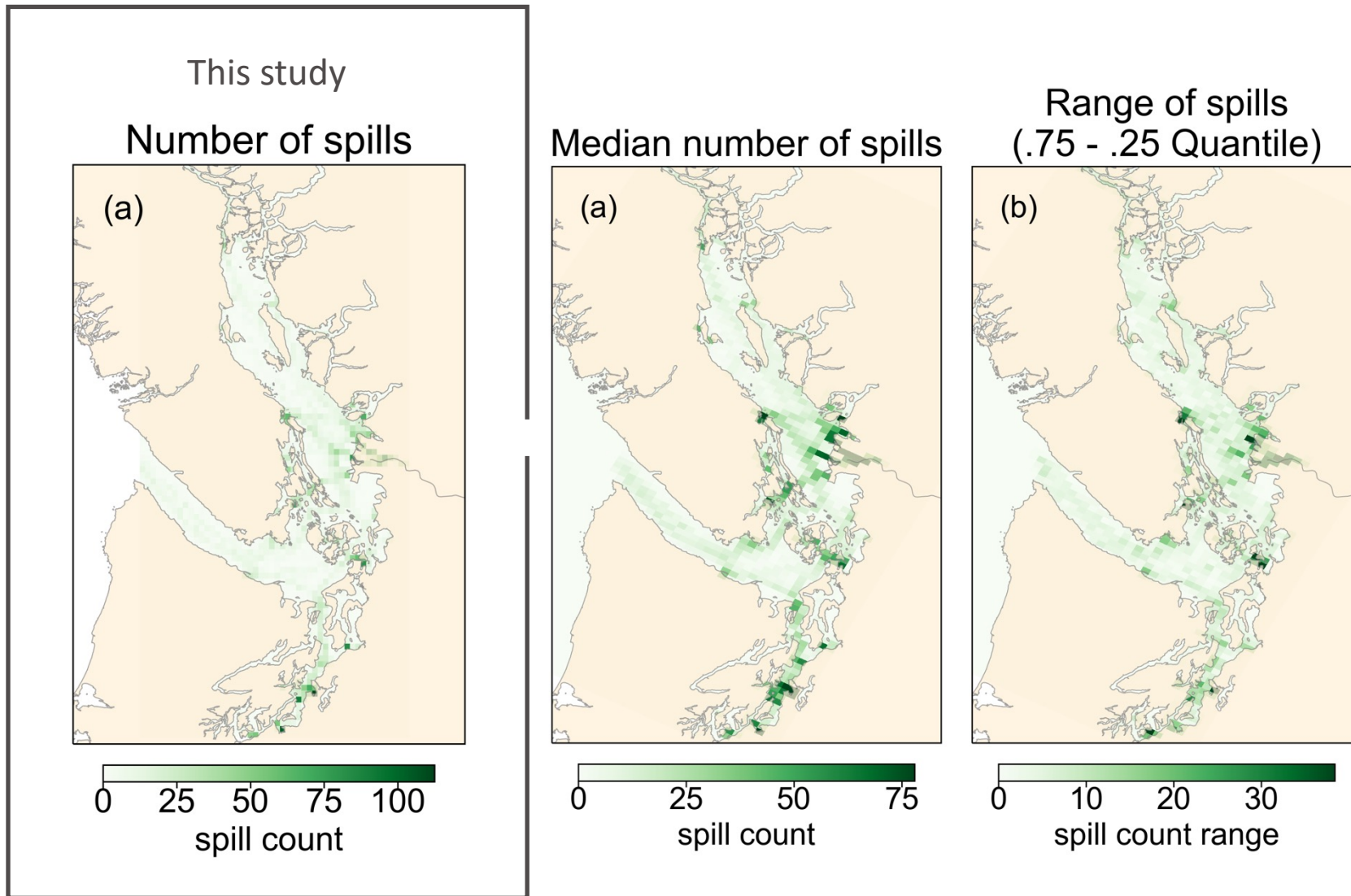
Approximate area of spills included in this preliminary example



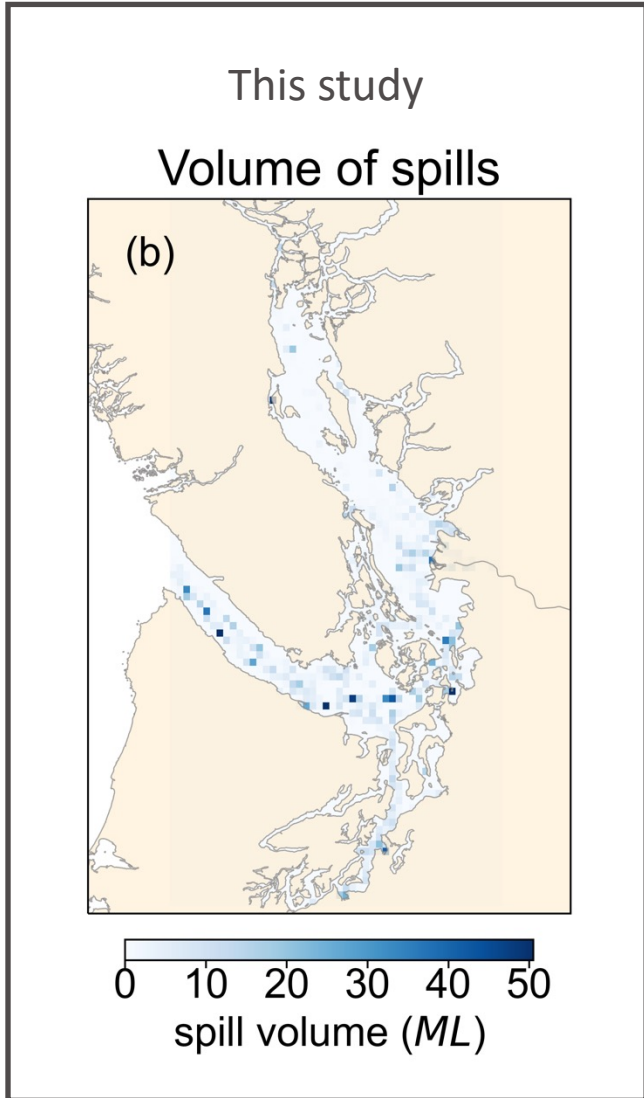
Spatial characteristic of 10,000 spills shown here



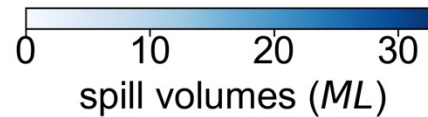
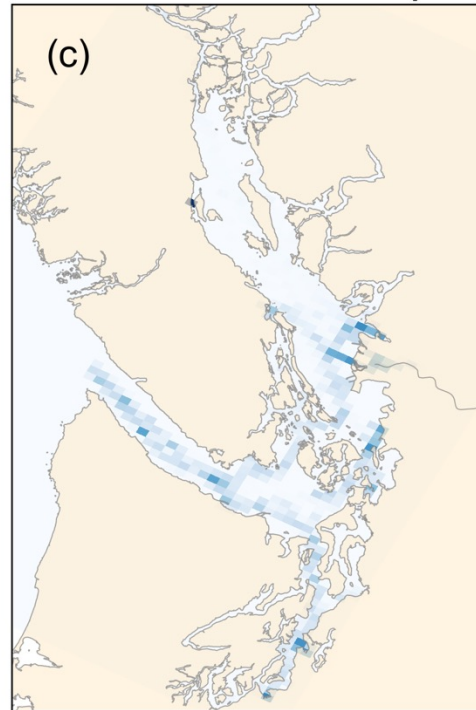
Variation in the number of spills (9 iterations)



Our study: Number of spills and spill volumes



Median volume of spills



Range of volumes
(.75 - .25 Quantile)

