

Identifying a hotspot of euphausiid co-occurrence with low pH and oxygen along the west coast of Canada and United States

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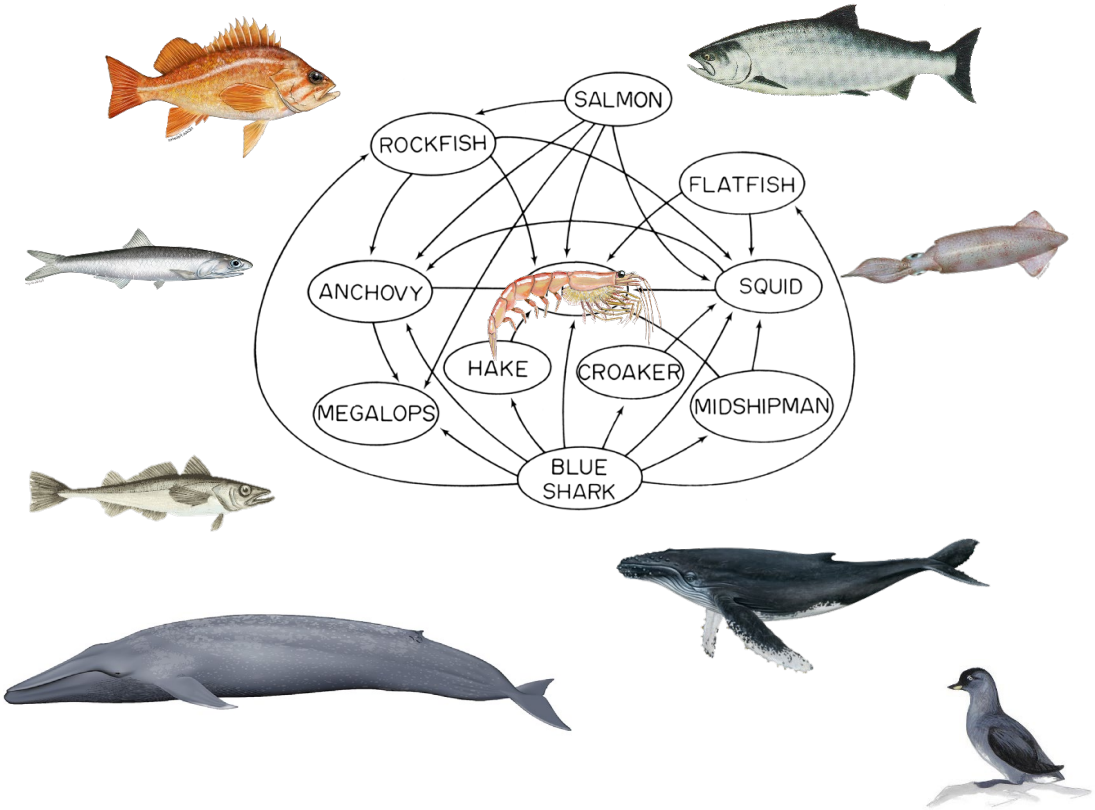
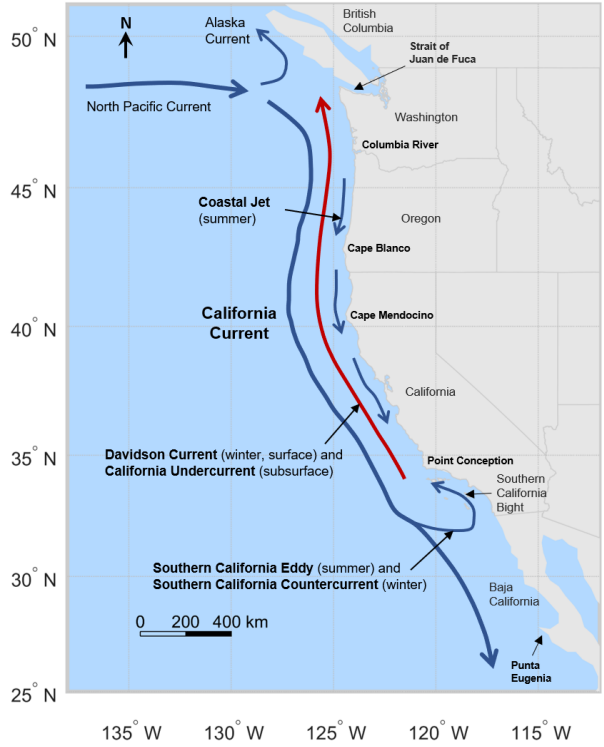
Euphausiids are important part of California Current food web





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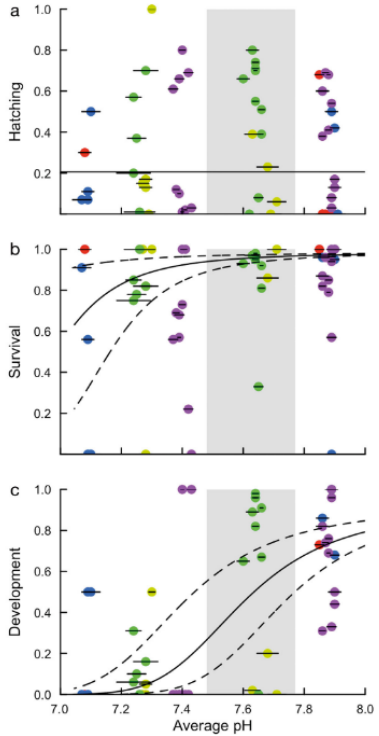
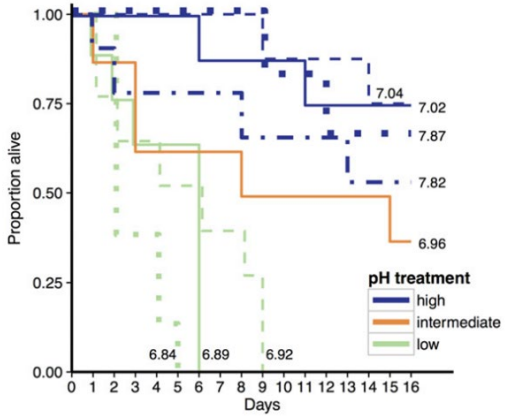
Krill are sensitive to low pH and oxygen, but field observations limited

- Decreased survival and development of krill collected in Salish Sea (McLaskey et al 2016)
- Respiratory potential declined with decreasing O_2 (McLaskey and Keister 2021)
- Survival of krill from Monterey Bay declined at very low pH (Cooper et al. 2017)





Expand field observations of ocean acidification and hypoxia in the California Current to understand potential impacts

Estimate Krill Abundance

Leverage long-term joint U.S.-Canada survey dataset.

Reconstruct Carbonate Chemistry

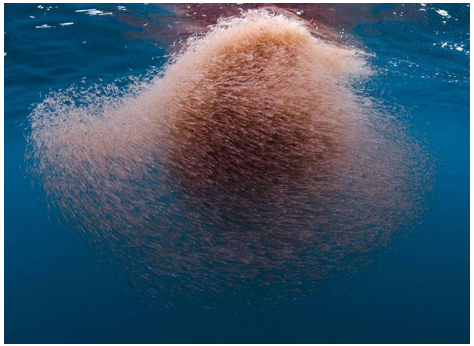
Derive ocean chemistry parameters from CTD casts.

Validate pH Estimates

Compare with separate estimates of DIC and TA.

Map Spatial Overlap

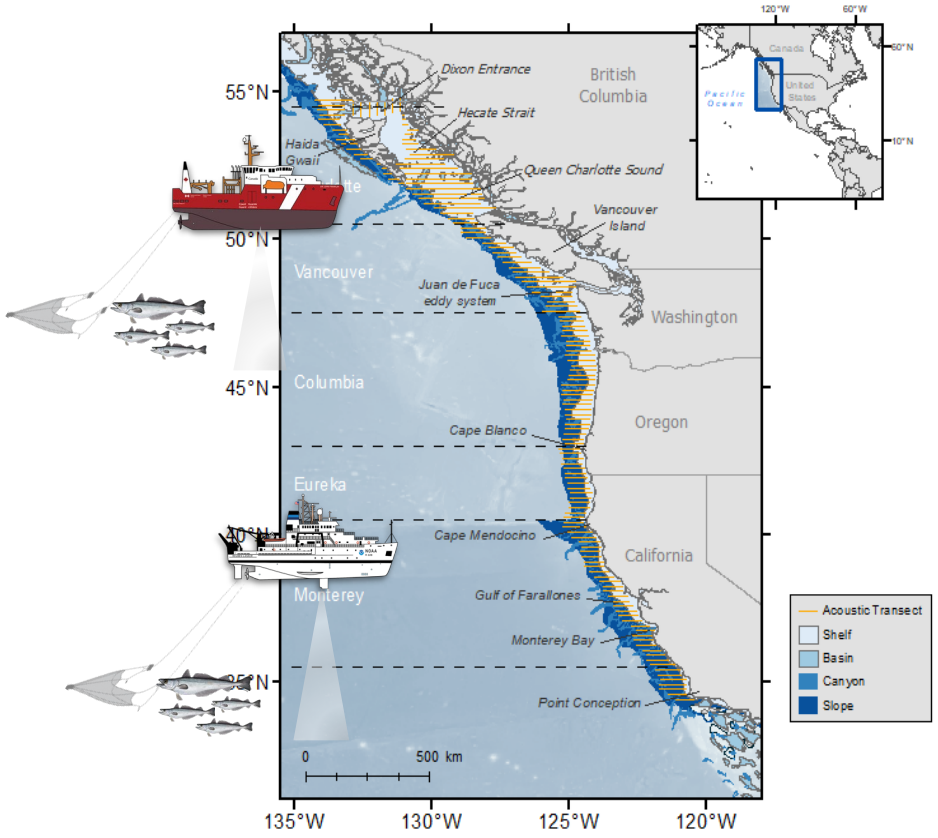
Evaluate krill exposure to low pH and hypoxic waters.





The Joint U.S.-Canada Fisheries-Acoustic Trawl Survey

- Timeline spans 2003 – 2025, mid-June to mid-September, coastwide
- Index of krill abundance developed from acoustic data
- Oceanographic data from CTDs
  - 50, 150, 300, 500, 1500 m isobaths



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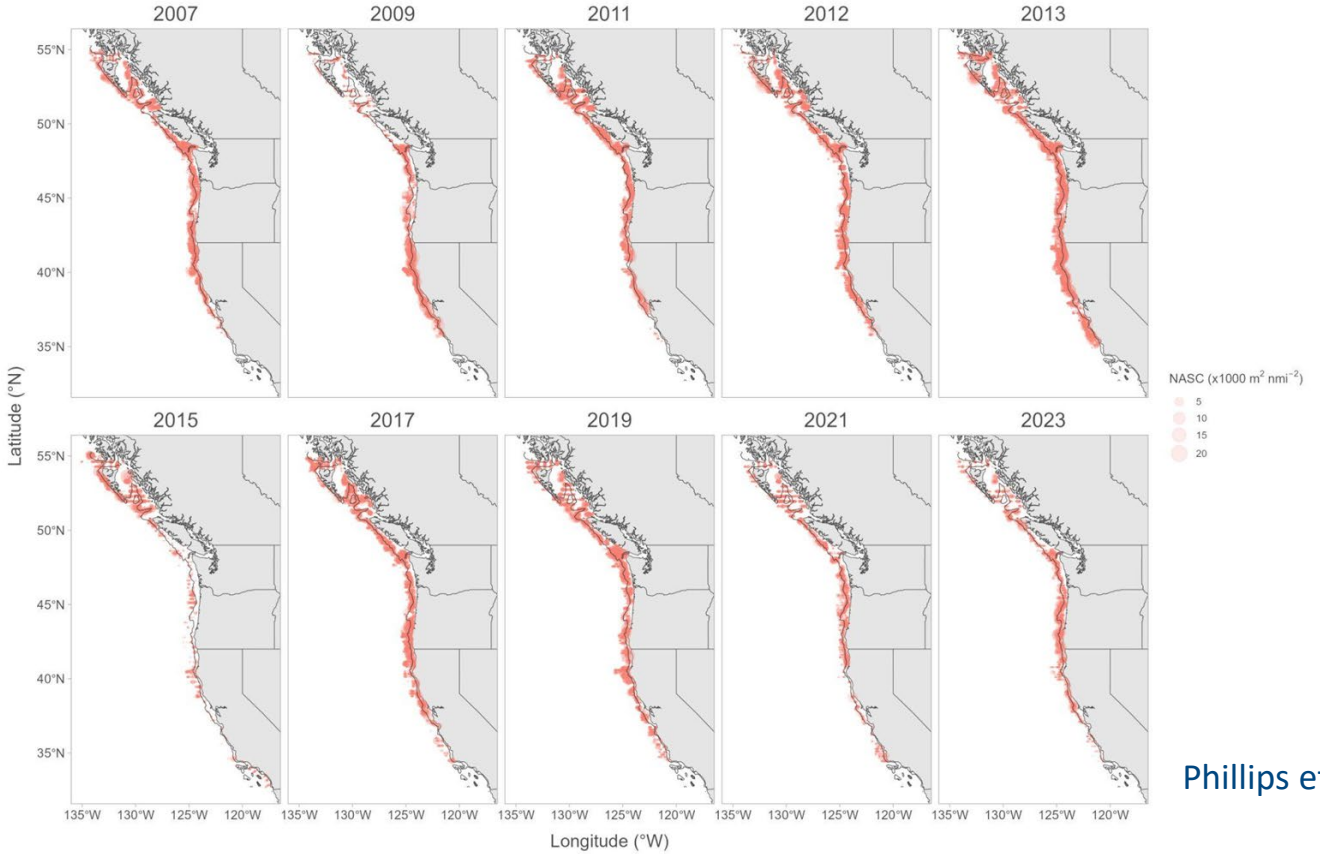
Krill backscatter varies along the coast between 2007 - 2023



Phillips et al. 2022 ICES JMS

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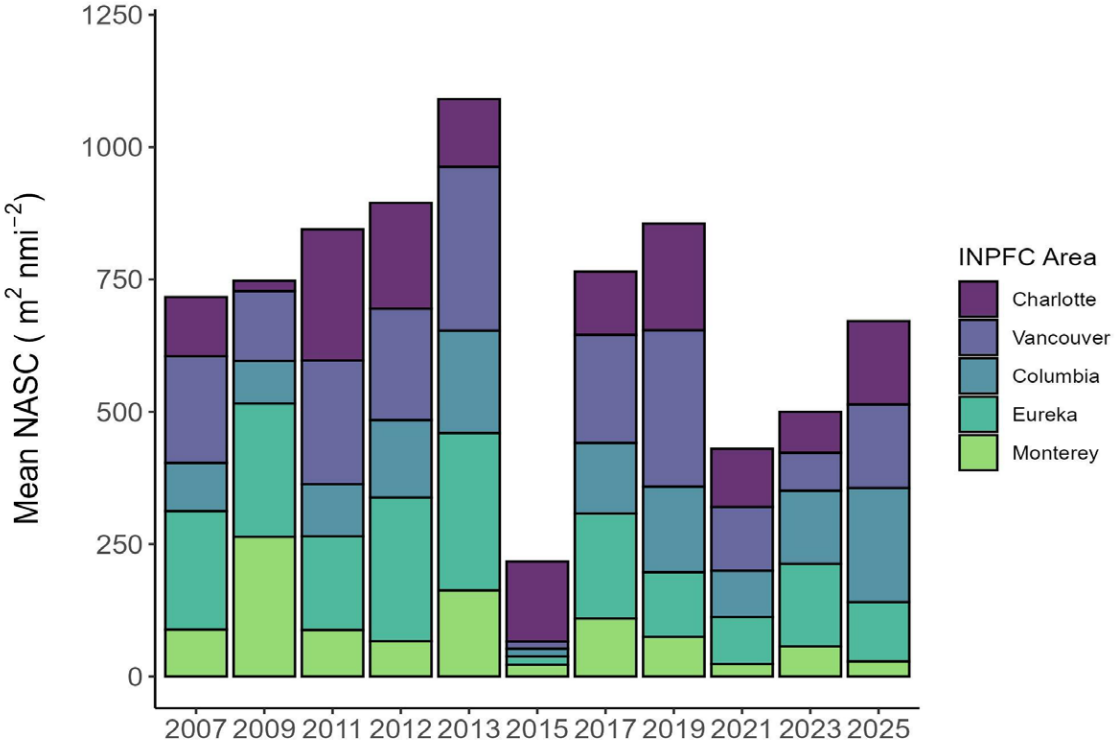
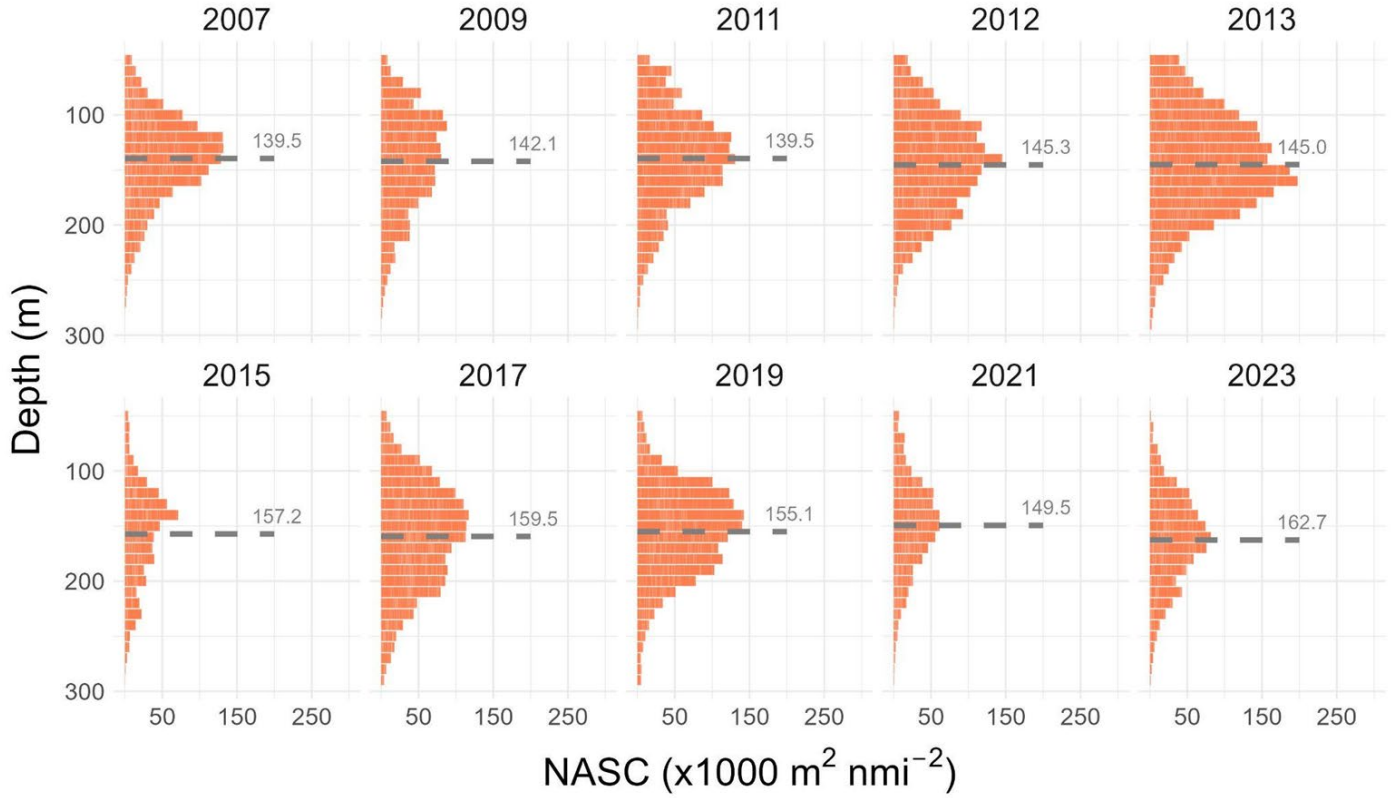
Tracking krill abundance through time in California Current



Hunsicker et al. 2026 NOAA ESR

Daytime krill vertical distribution is consistent



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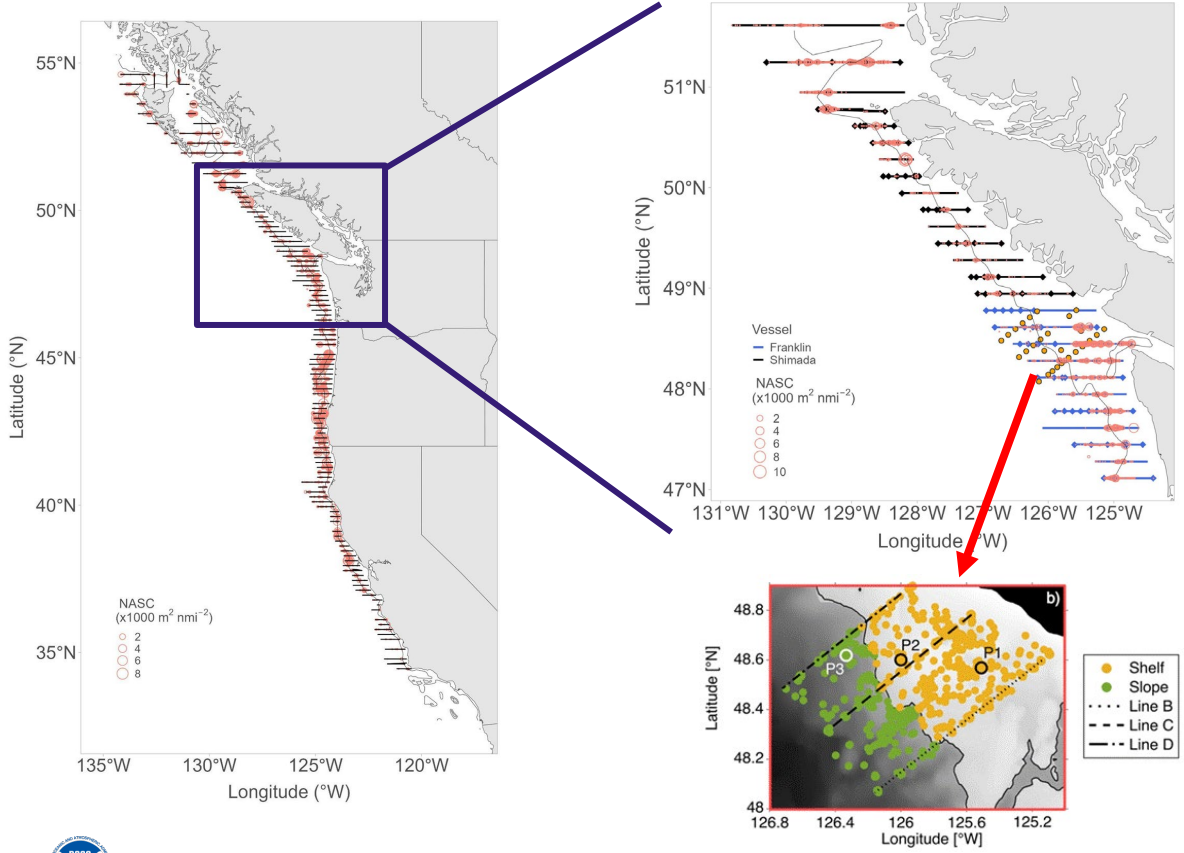
Krill and CTD data from August-September 2023



- Franklin: 43 casts, August 19 – 30
- Shimada: 46 casts, August 28 – Sept 4
- Tully: 27 casts, August 25 – 28

Maier et al. 2025 JGR

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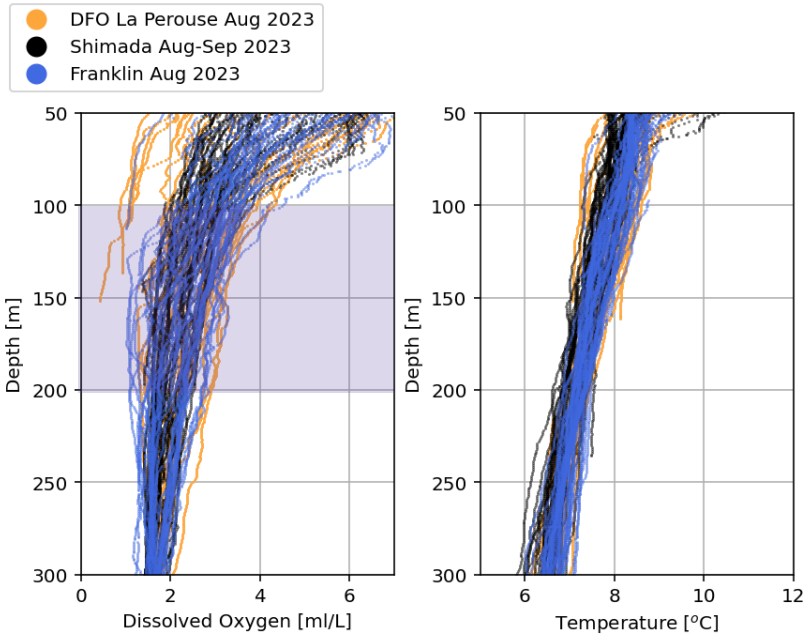
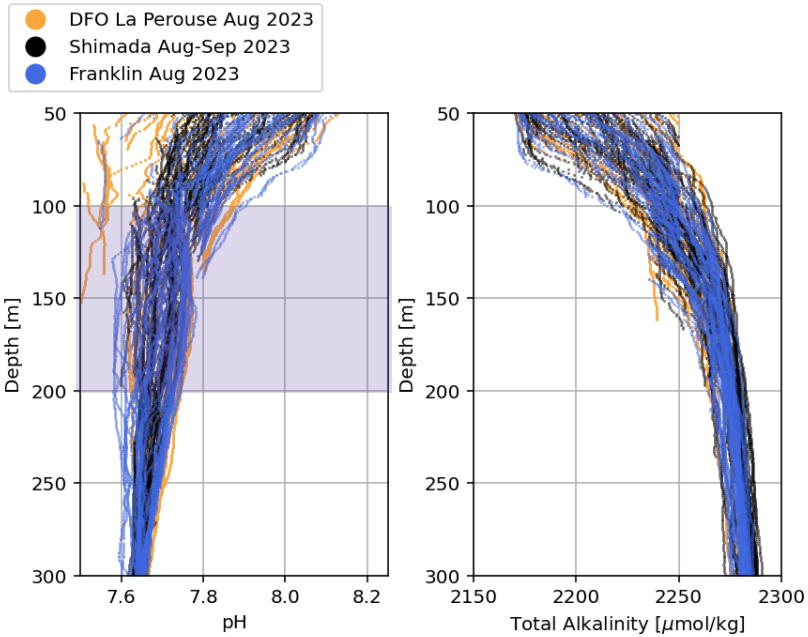
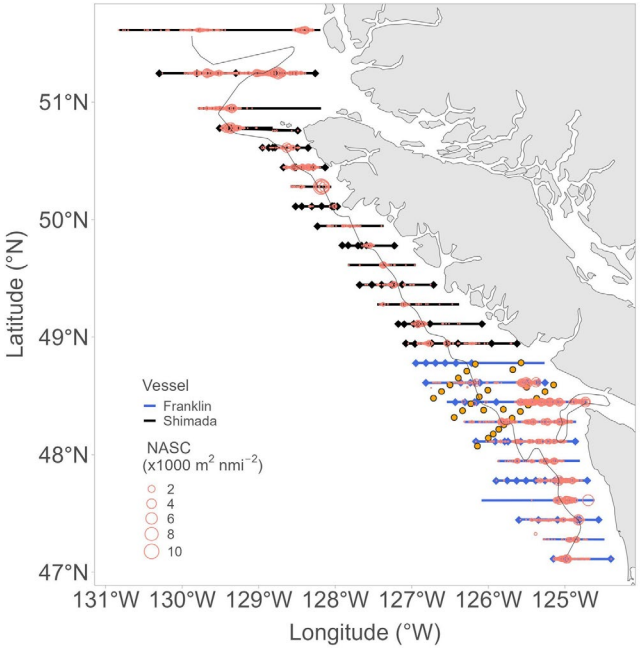
Three separate datasets produce comparable measurements

- Direct comparisons of Dissolved Oxygen and Temperature from CTD casts
- TA derived using previously-established relationships (Ross et al. 2020, Franco et al. 2021)
- pH estimated from TA (Dosser et al. in prep)





Krill hotspots overlap with low oxygen, low pH



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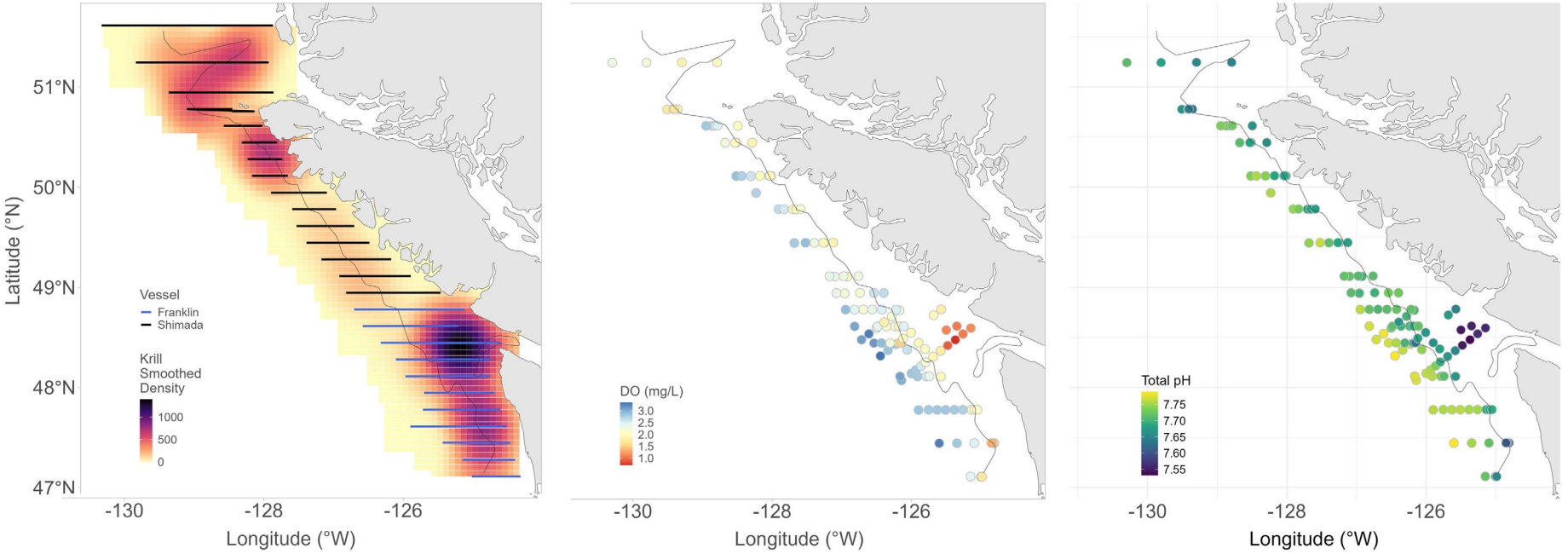

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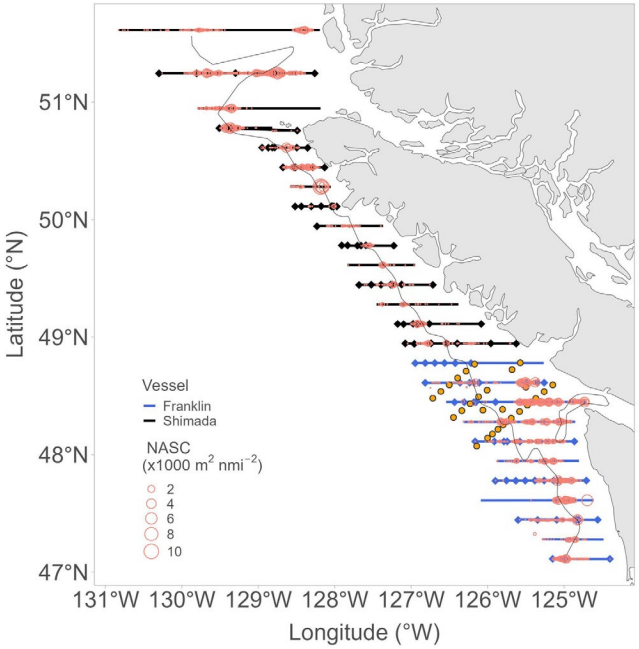
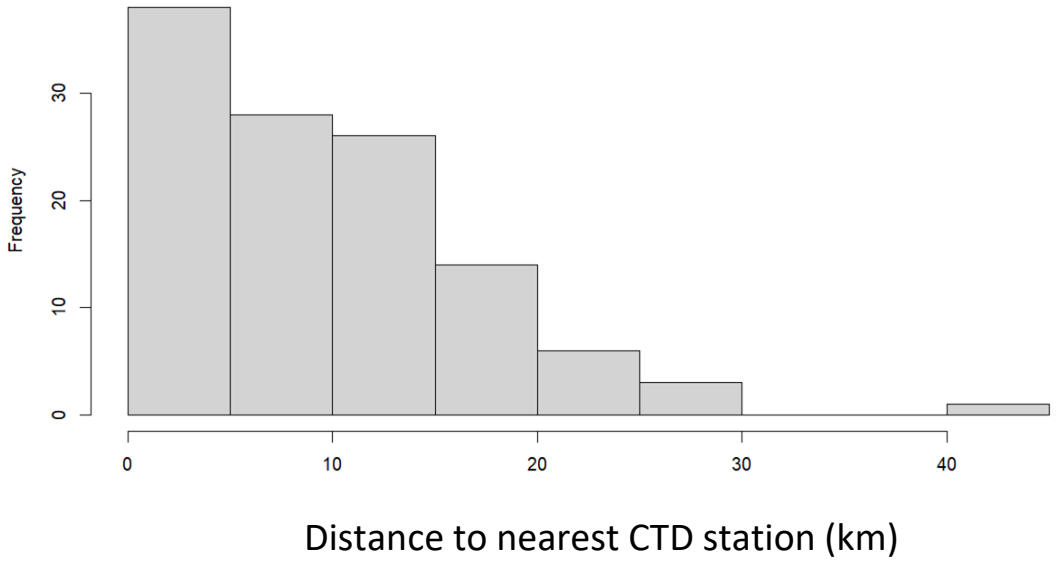
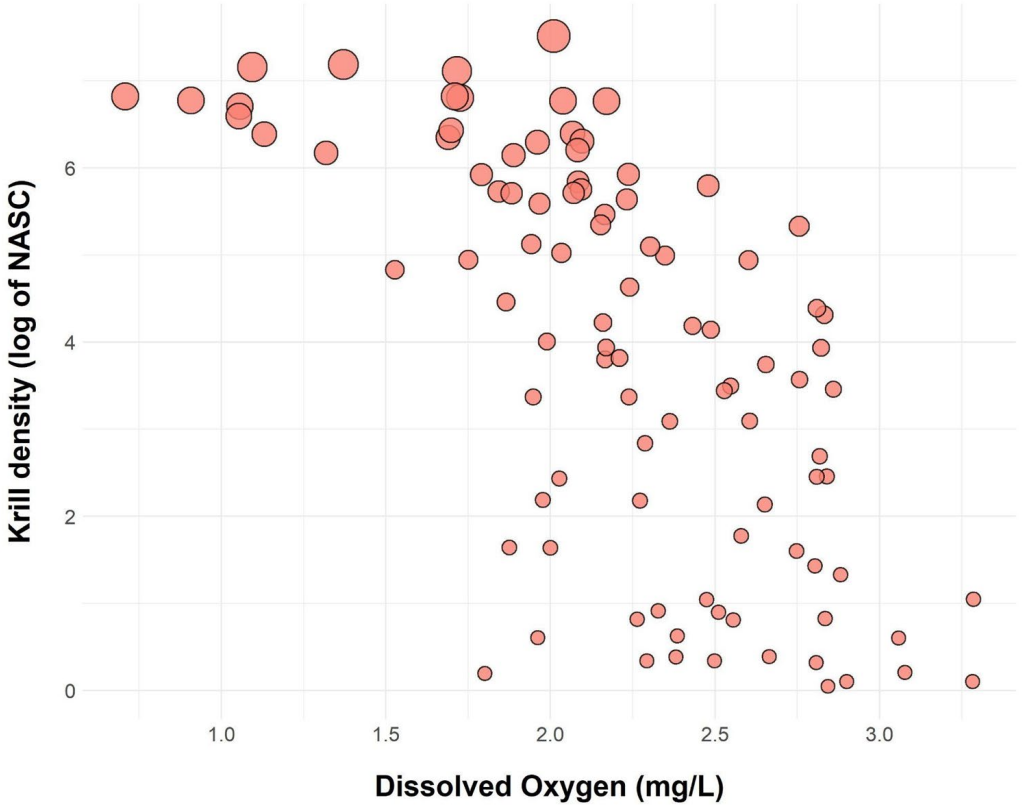
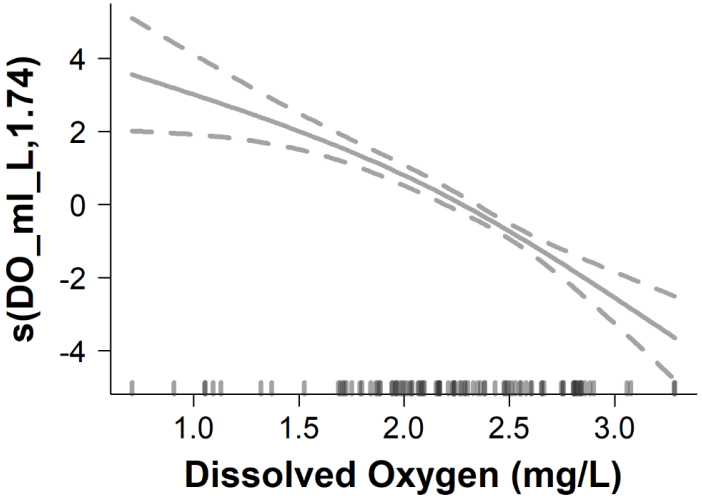
Matching krill observations to nearest CTD station





Greatest krill densities correlated with hypoxic waters





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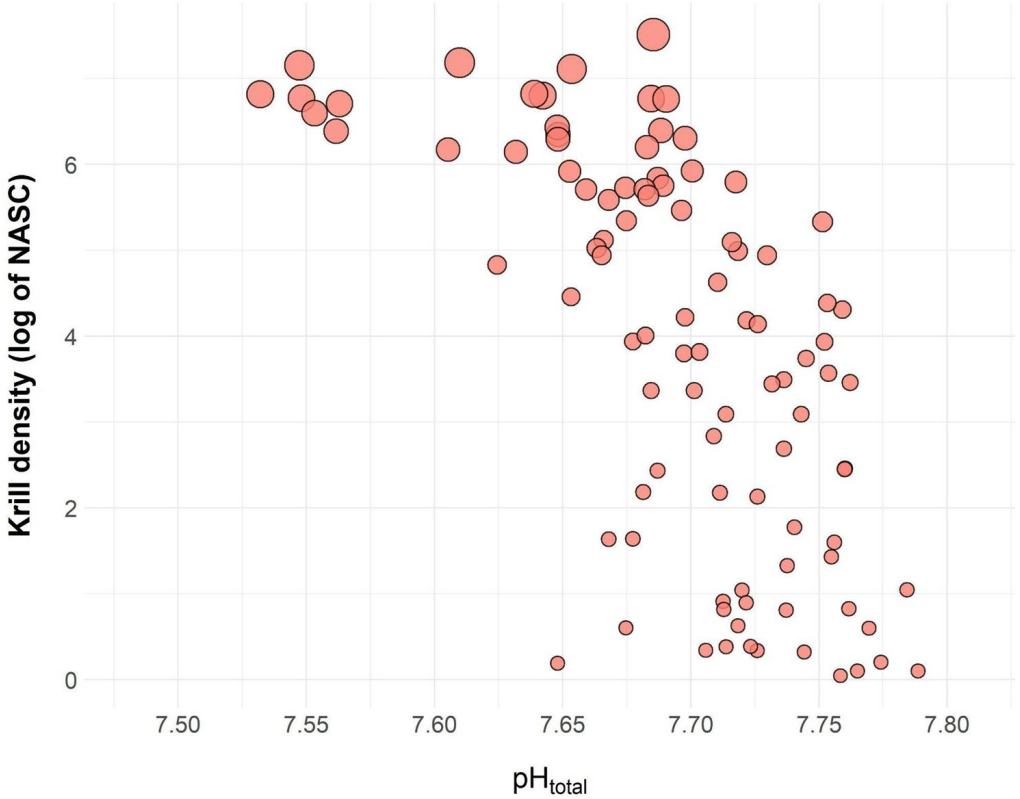
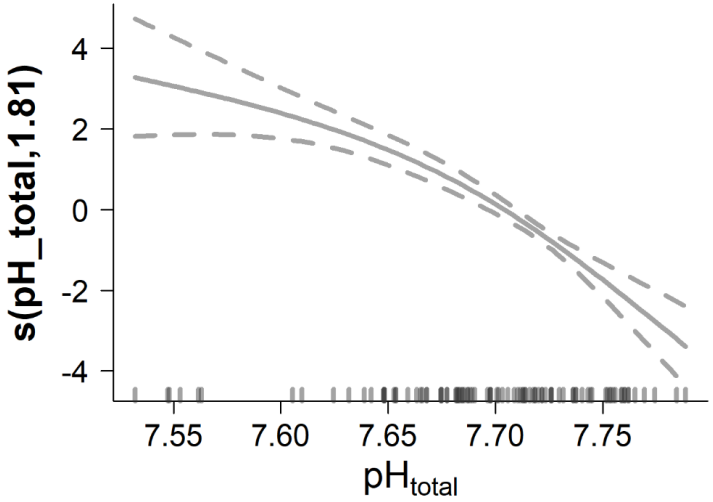
…and with low pH





Results and Discussion

- ✓ Juan de Fuca Eddy System is a hotspot for krill, but also the area of lowest pH, hypoxic waters
- ✓ Krill occur in the most ‘stressful’ waters in the study area
- ✓ Carbonate chemistry can be estimated from CTDs collected during joint US-Canada fisheries survey



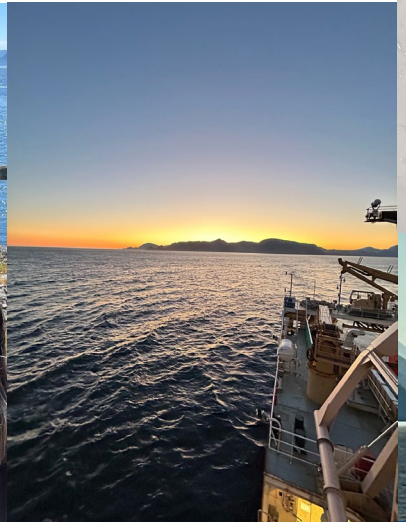
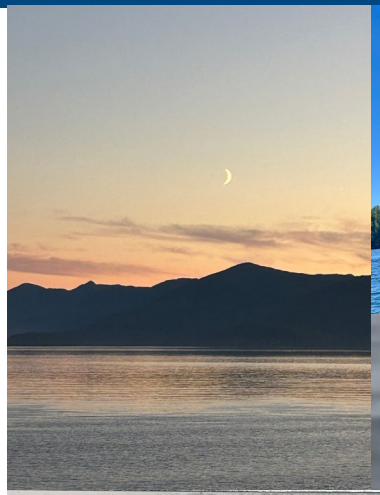
Next Steps:

- ❑ Estimate carbon chemistry in additional survey years (2010 - 2021)
- ❑ Support efforts to sample and monitor this area

Thank you! Merci!

Oceanographer to process CTD data: 8K
Travel to Canada: 2K
Starting a new cross-border OA collaboration: Priceless





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OAP
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