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Framing dynamic interactions between offshore wind energy development and commercial fisheries

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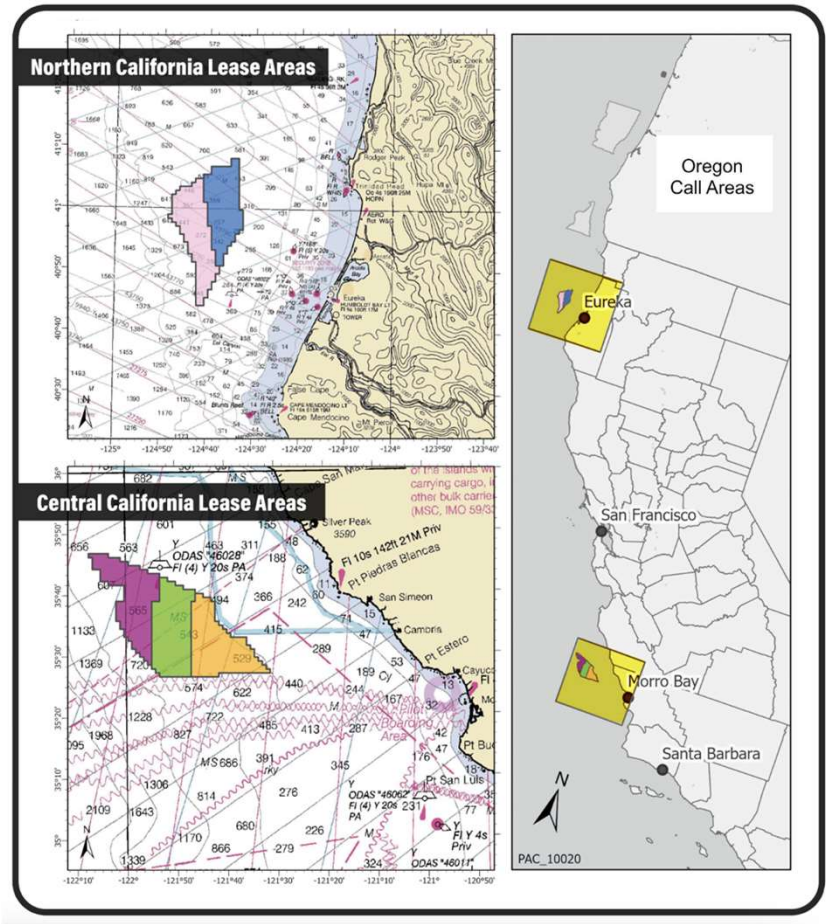
Offshore wind energy development on U.S. West Coast

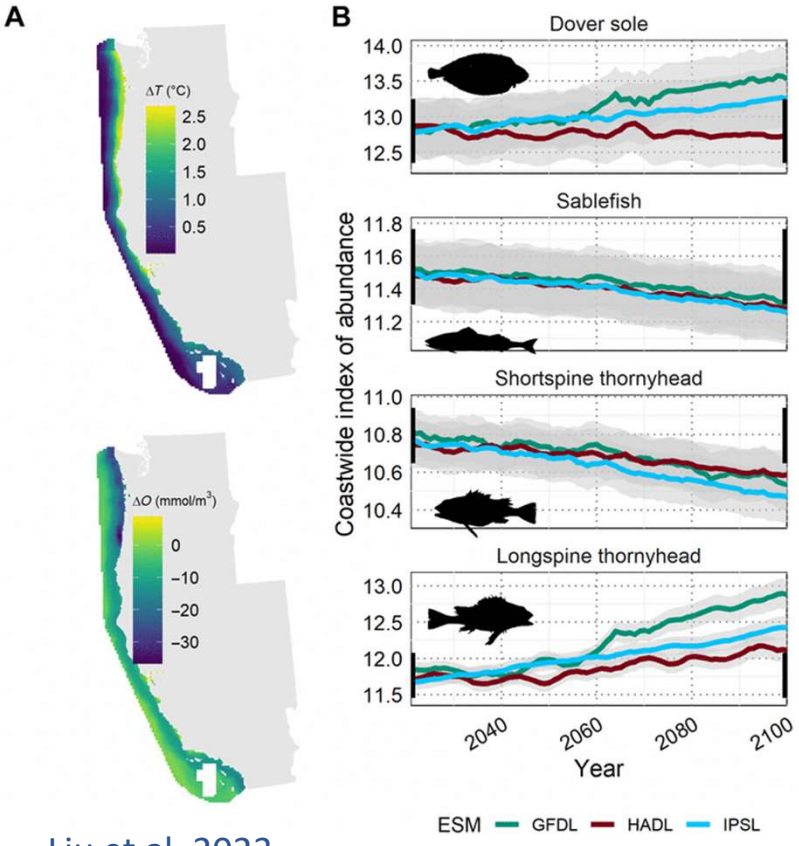
- OWE areas identified in California and Oregon
- Planning efforts have considered conflicts with other ocean users and environmental resources
- Considerations-to-date have not accounted for future climate scenarios



Climate variability alters species abundance & distributions

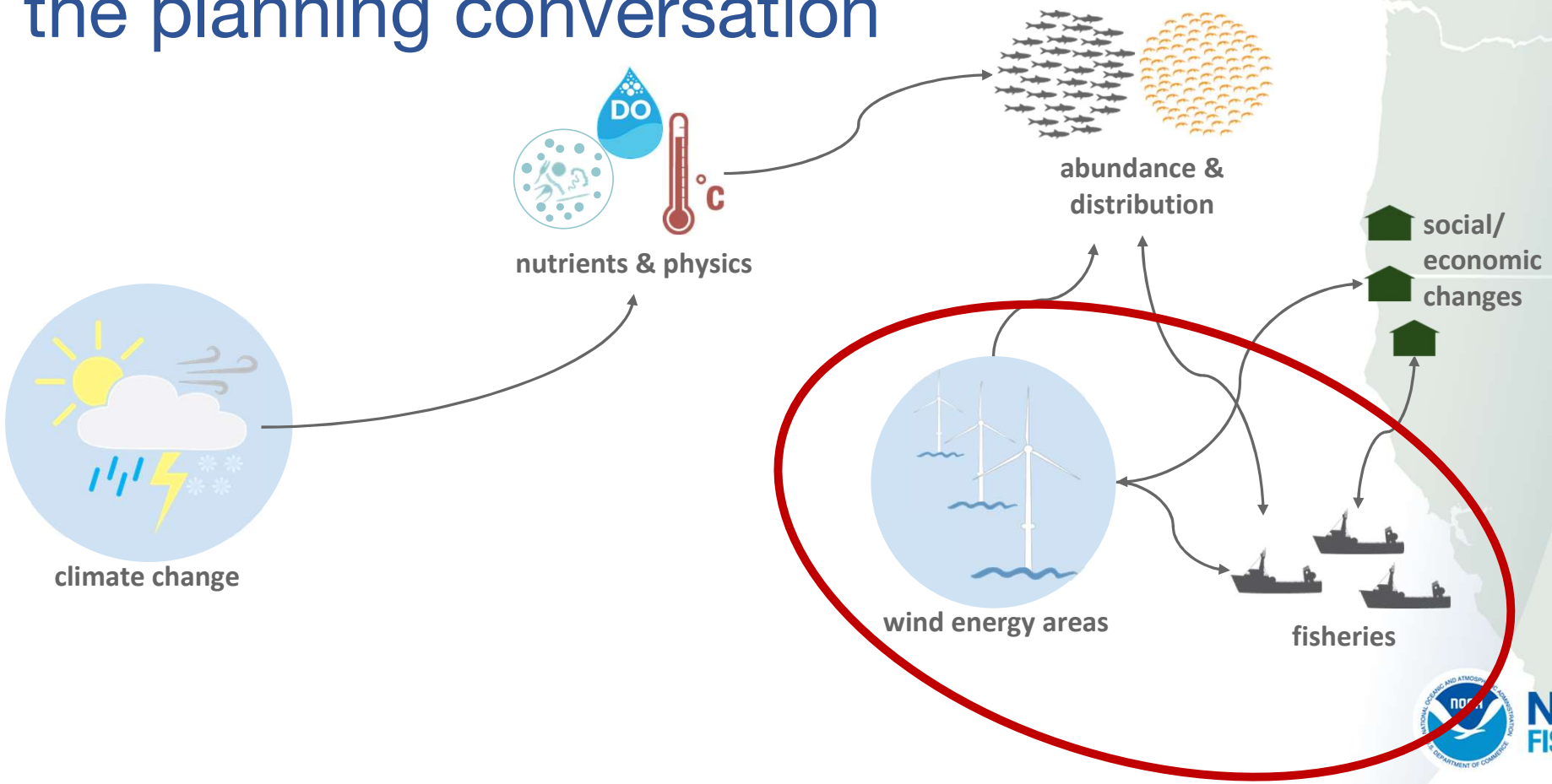
- Oceanographic variables are predicted to change over the coming century across the U.S. West Coast

- Bioenergetic relationships suggest fisheries stocks (and other species):
  - Abundance will change
  - Spatial distribution will shift



Liu et al. 2023

Our goal is to add future climate scenarios to the planning conversation



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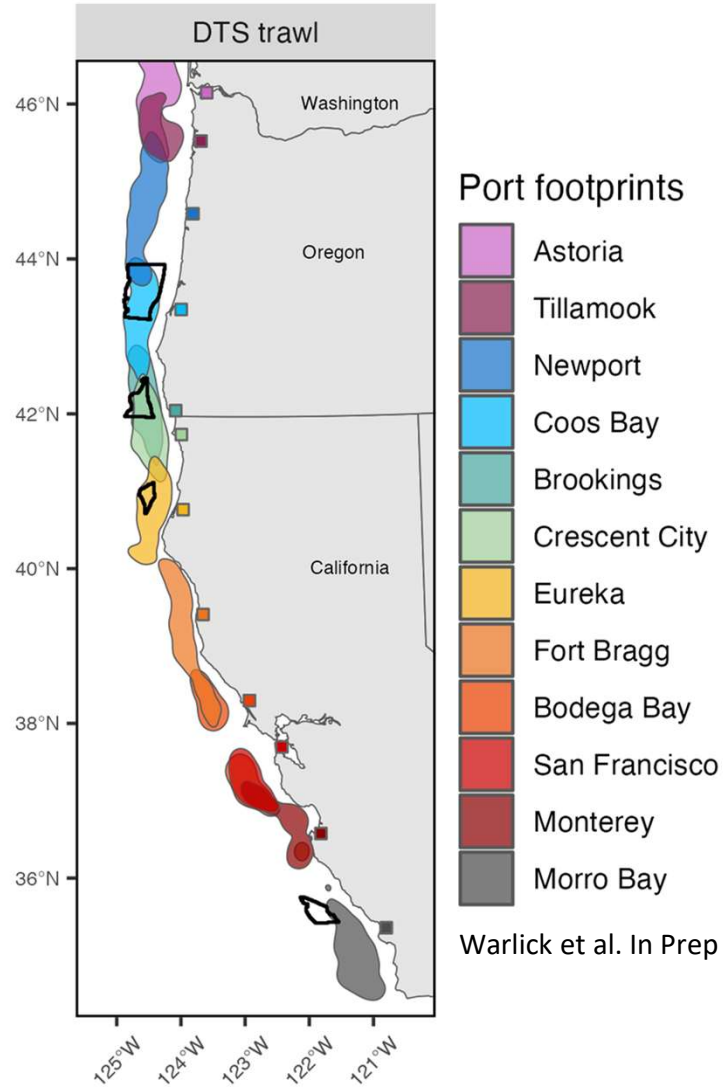
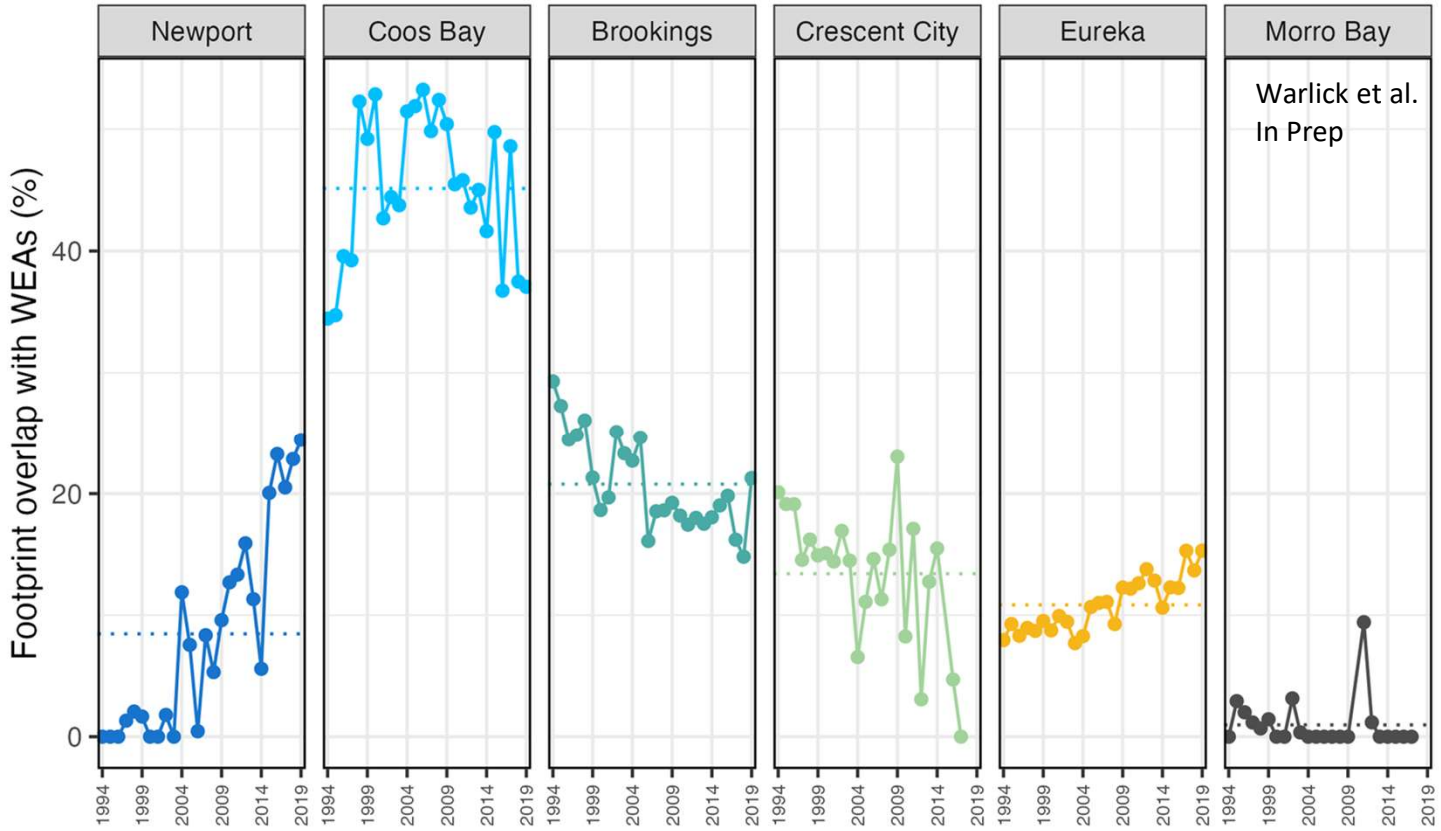
Fisheries footprints

- **DTS** Groundfish fishing grounds 1994 – 2019
  - **D**over sole
  - Shortspine **T**hornyhead
  - Longspine **T**hornyhead
  - **S**ablefish
- Kernel density estimates based on location of 75% of landed fish (Samhouri et al. In Press)
- Risk = Exposure * Vulnerability



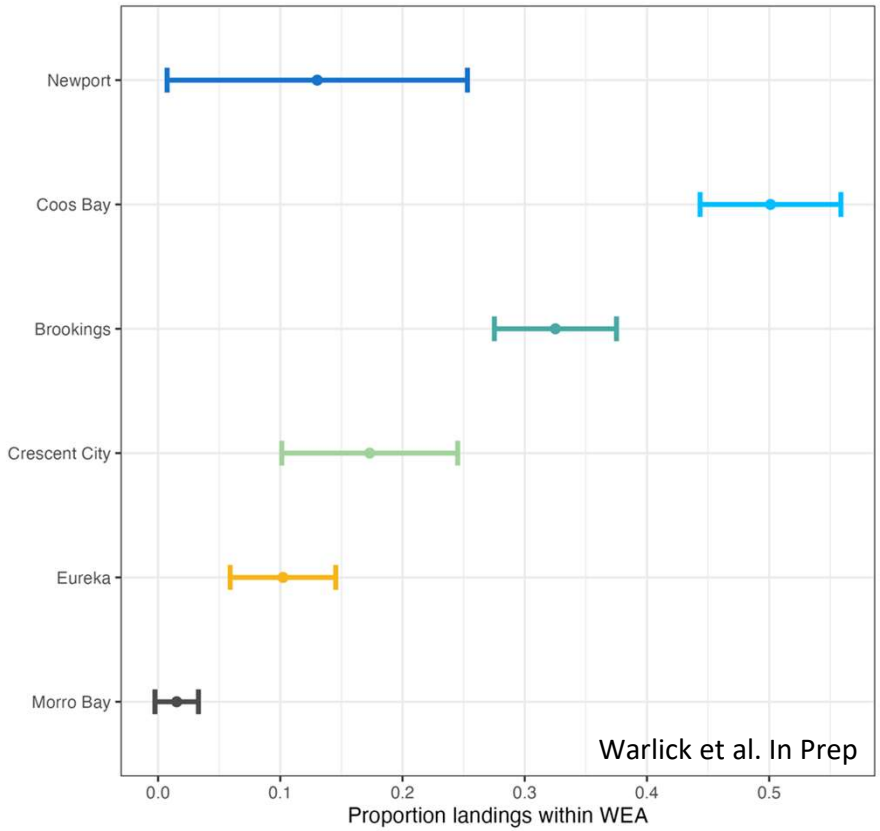
Warlick et al. In Prep

Exposure = % overlap of footprints with OWE

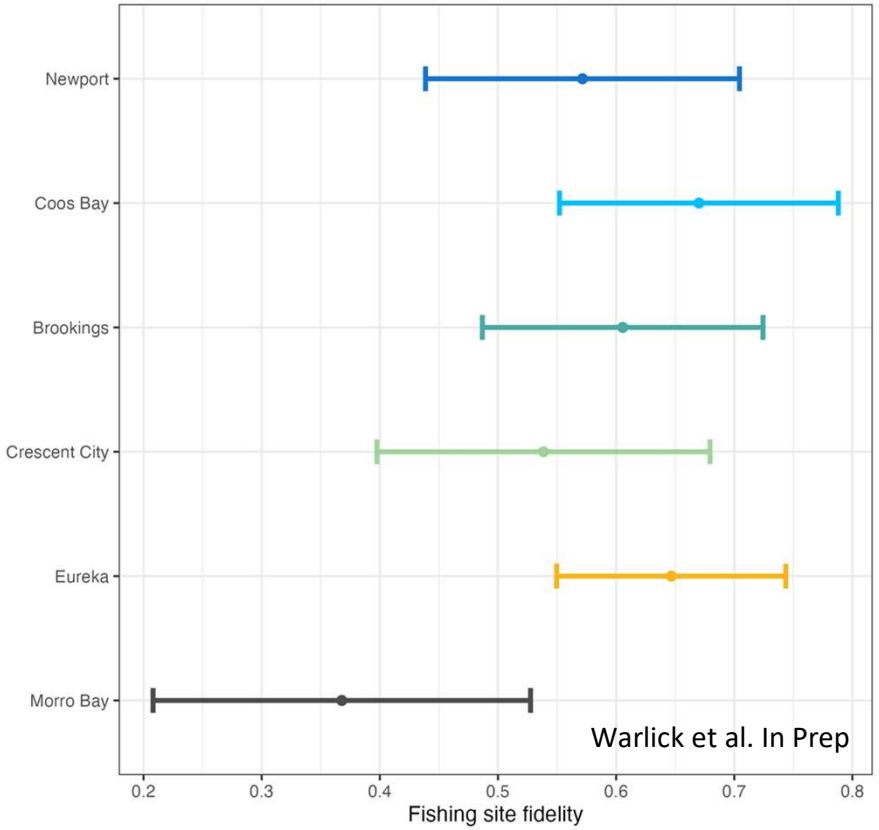


Vulnerability = Sensitivity * Adaptive capacity

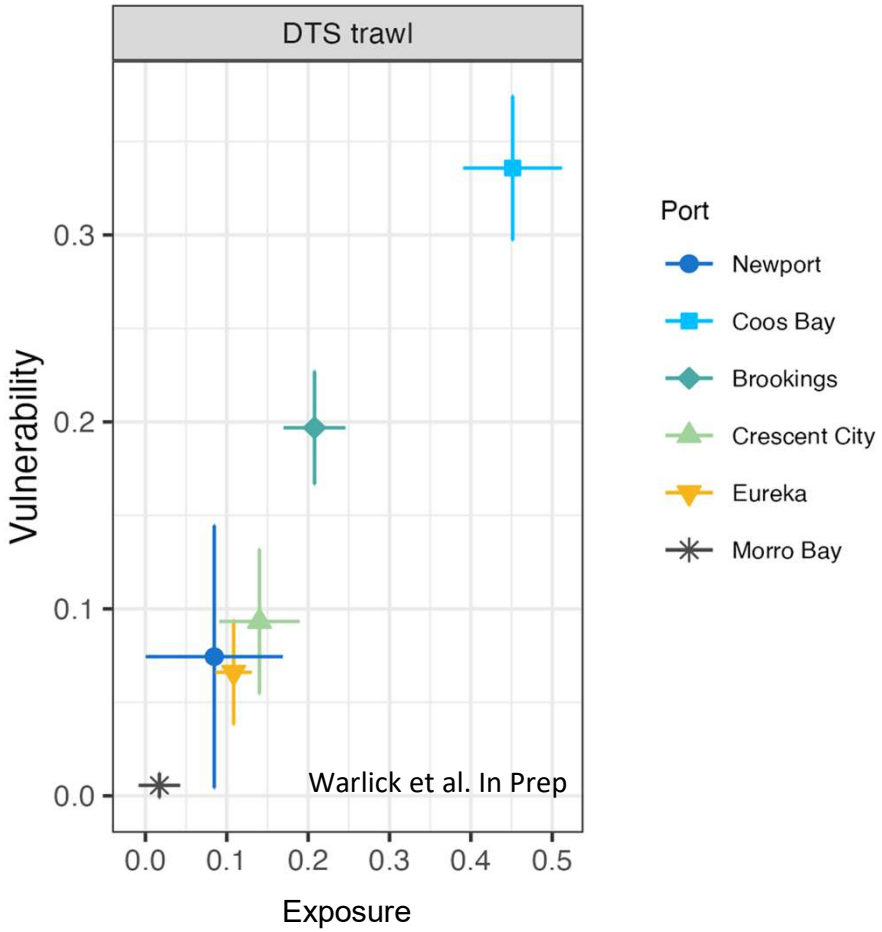
Sensitivity



Adaptive capacity

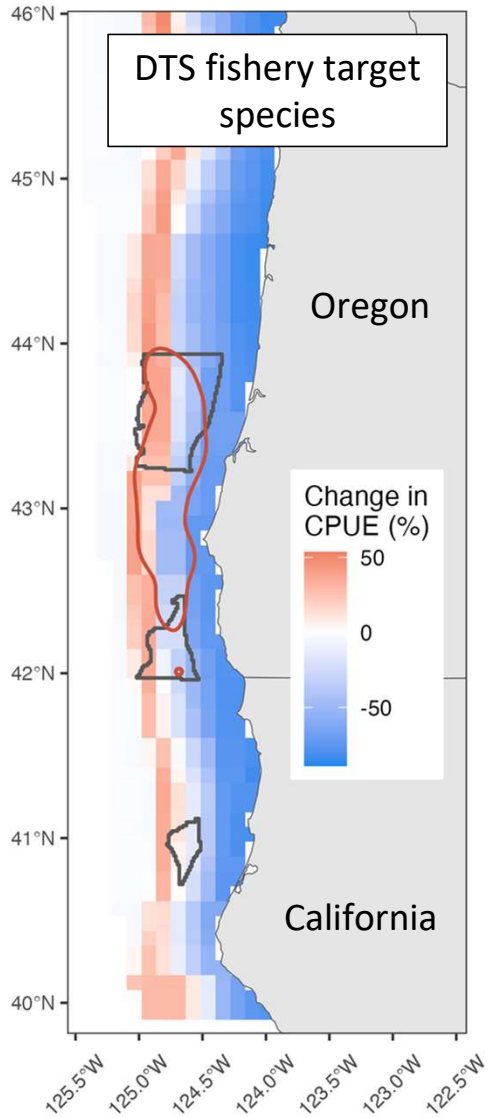


Historical risk to bottom-trawl DTS fisheries from OWE areas



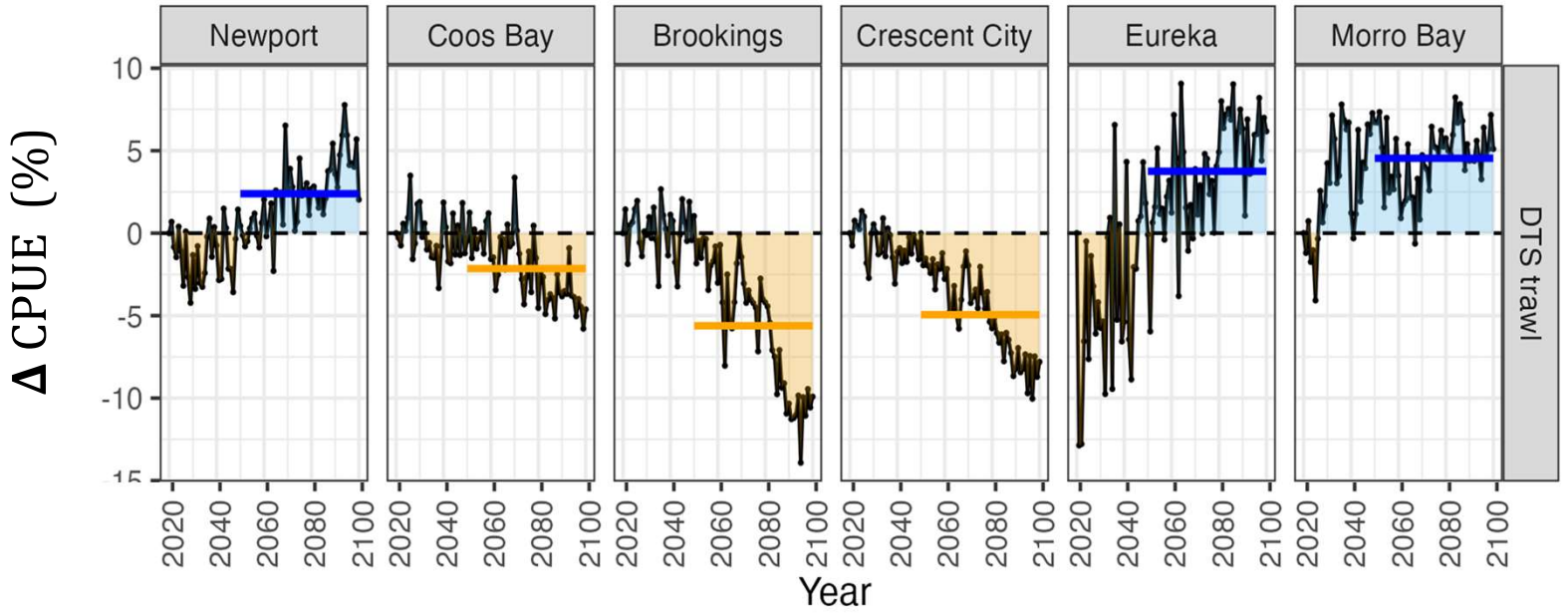
Species distribution shifts

- Distributional shifts in DTS species (Liu et al. (2023) relative to fishing footprints and OWE areas in northern CA and OR
- % change in CPUE from 2020 - 2100
- A general shift to deeper depths for these targeted species.

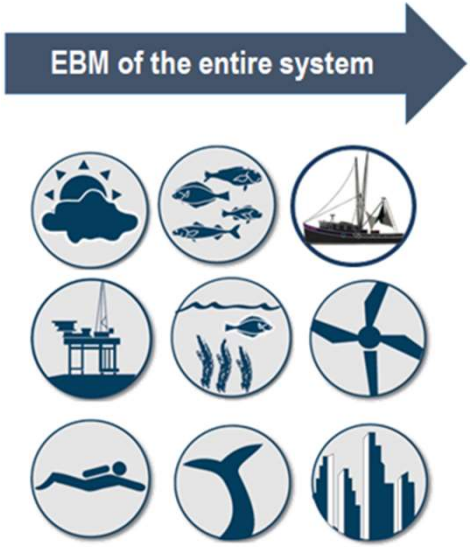


Projected climate-induced risk to bottom-trawl DTS fisheries

- Accounting for climate change affects assessment of risk
  - OWE areas anticipated to potentially become more valuable for some ports



Take home messages…

1. Spatial management needs to consider shifts in species distributions to be "climate-ready".

2. Risk of displaced fishing effort varies by port and over time, signifying the importance of considering future shifts into mitigation strategies.