

# Utilizing open access salmon trophic ecology data to understand spatial and interspecies dynamics across the North Pacific Ocean

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University of British Columbia/International Year of the Salmon

Idaho Chapter of the American Fisheries Society: Fish Without Borders II  
Workshop

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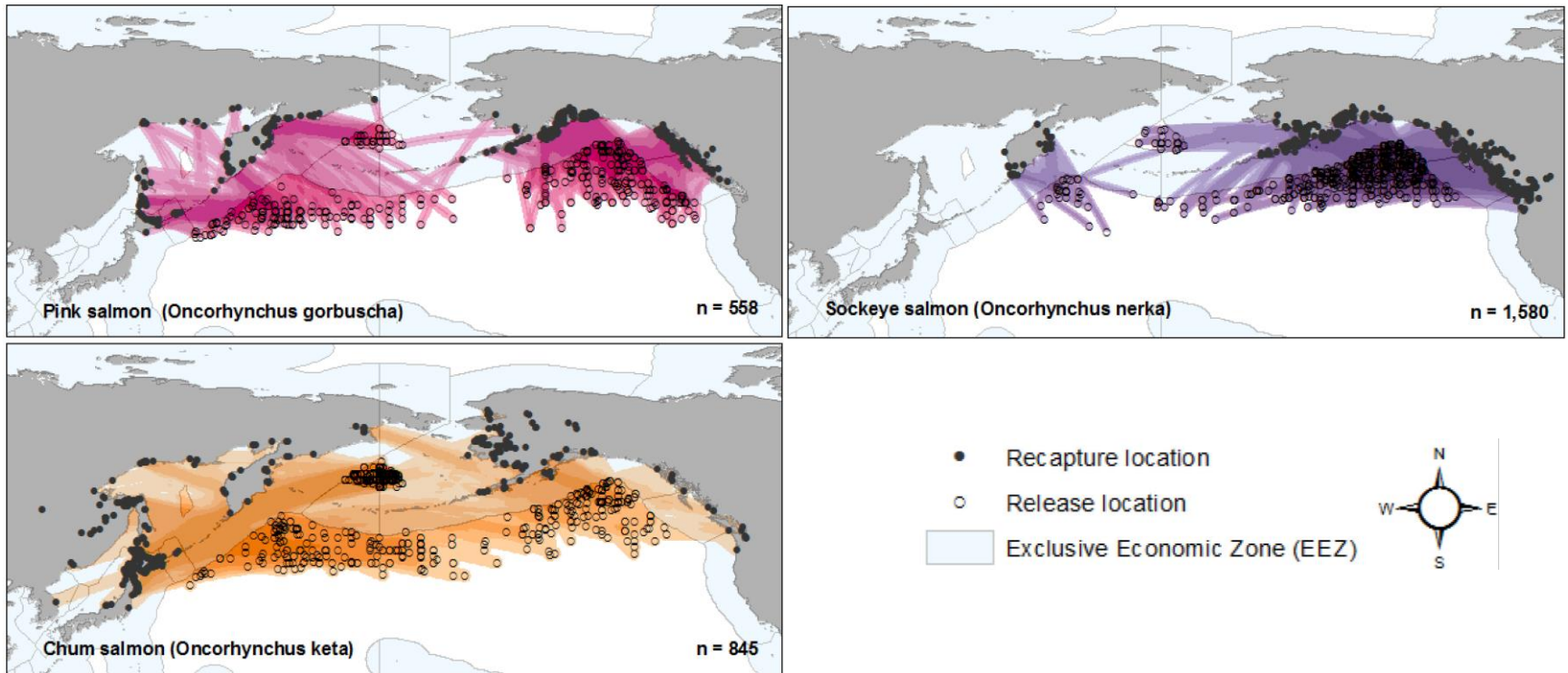
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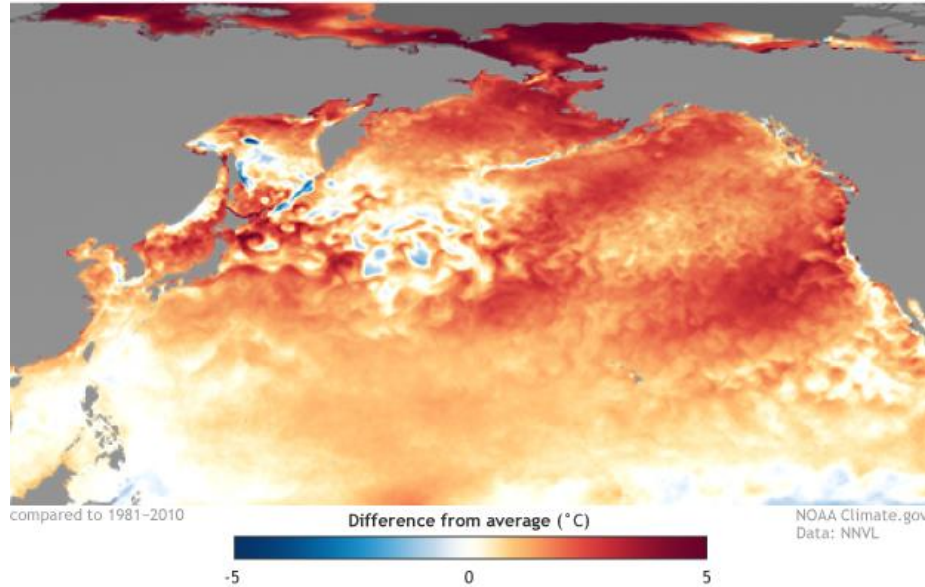
INTERNATIONAL  
YEAR OF THE SALMON

# Salmon in the North Pacific Ocean

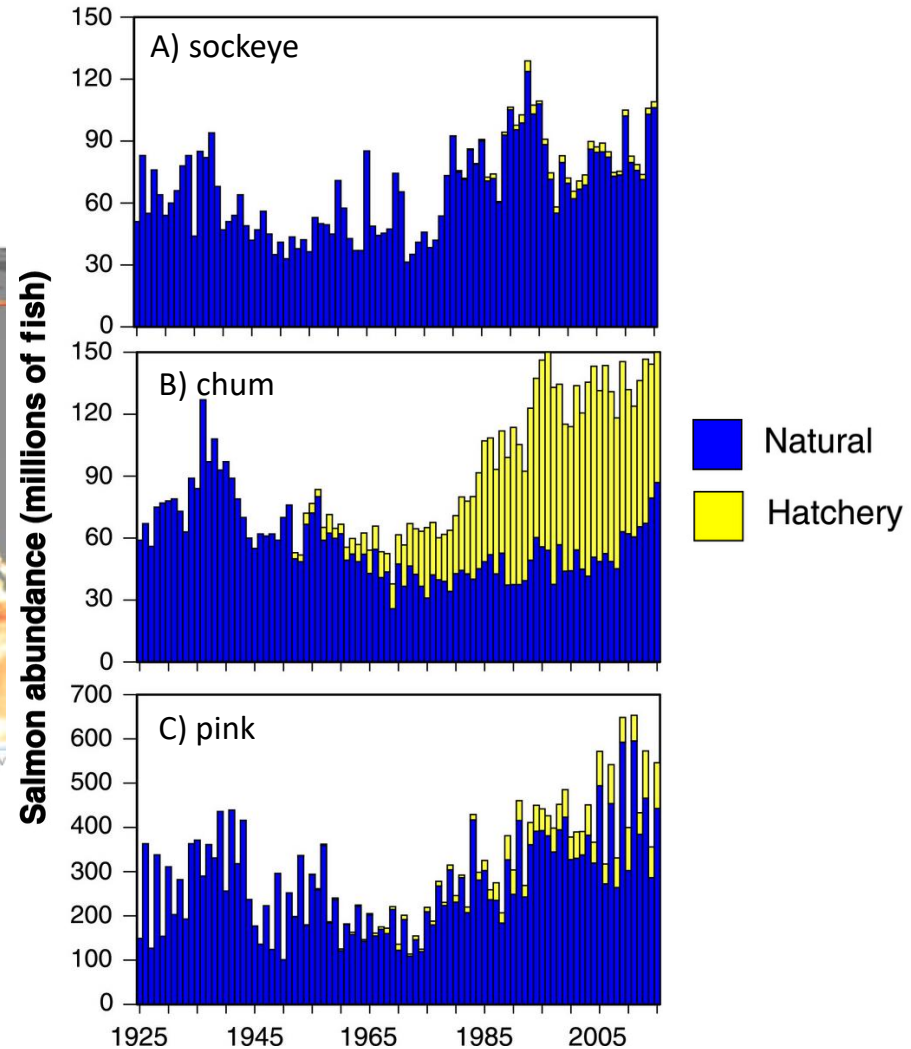


# Changing North Pacific

Sea surface temperature anomalies, September 2019

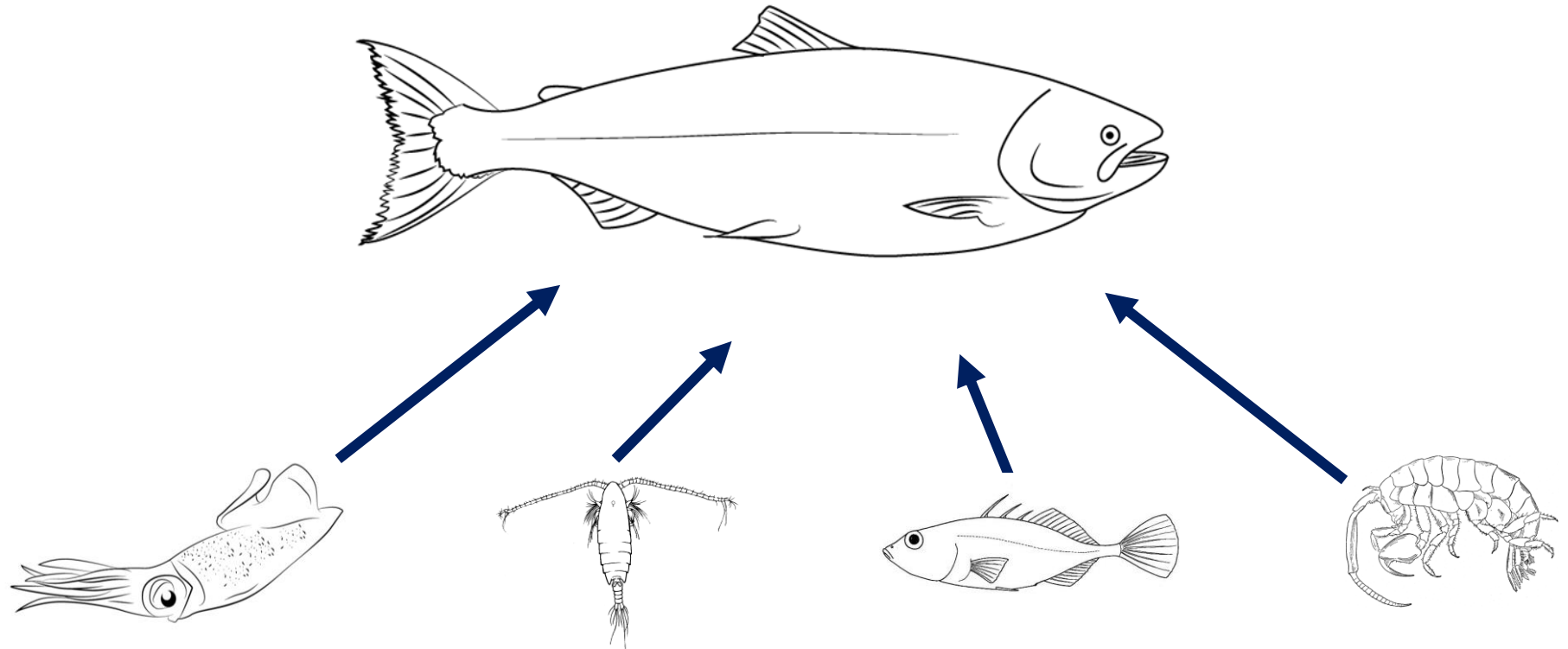


## Hatchery Production

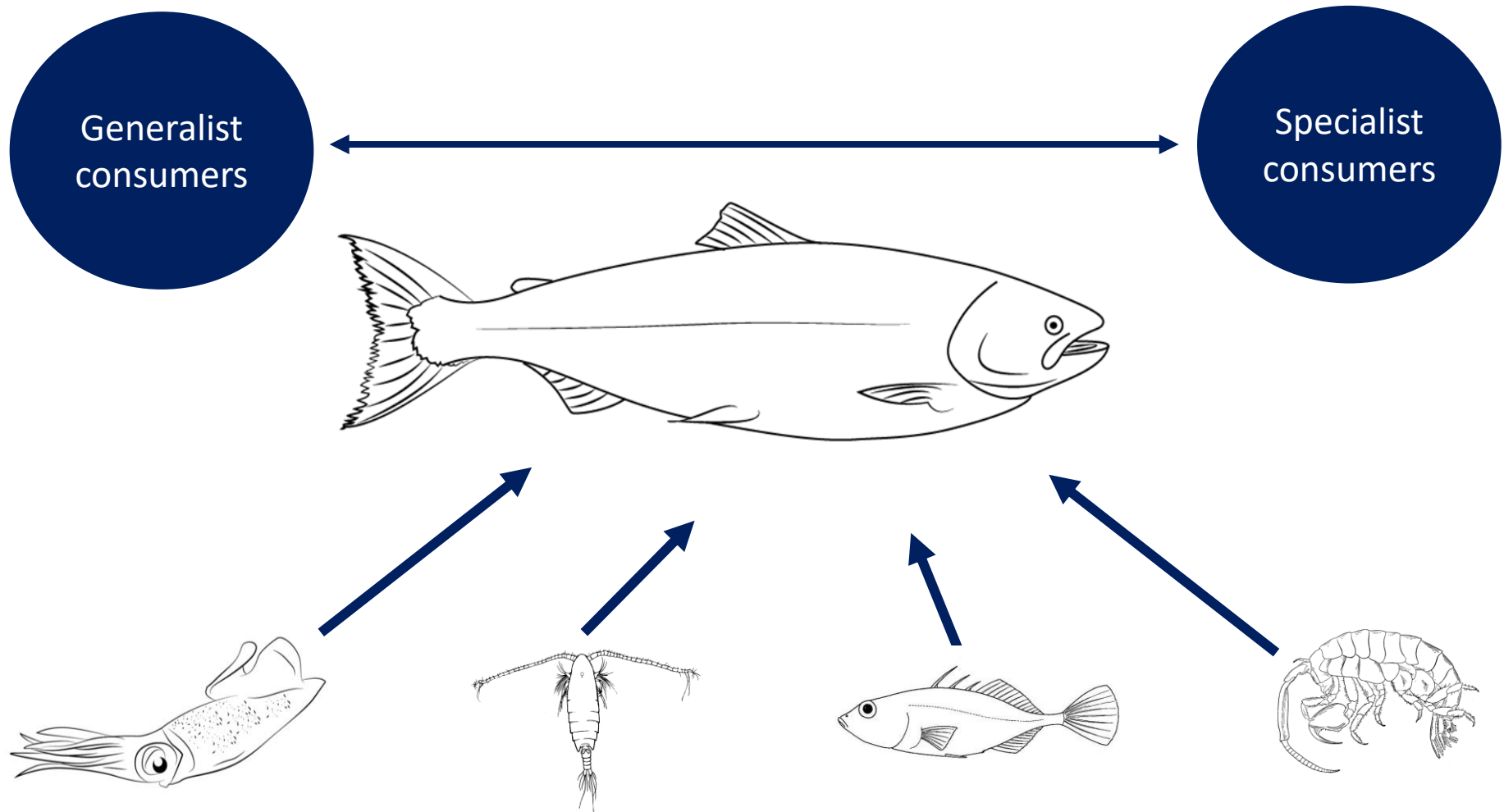


*Ruggerone and Irvine 2018*

# How can we study the dynamic marine phase of the salmon life cycle?



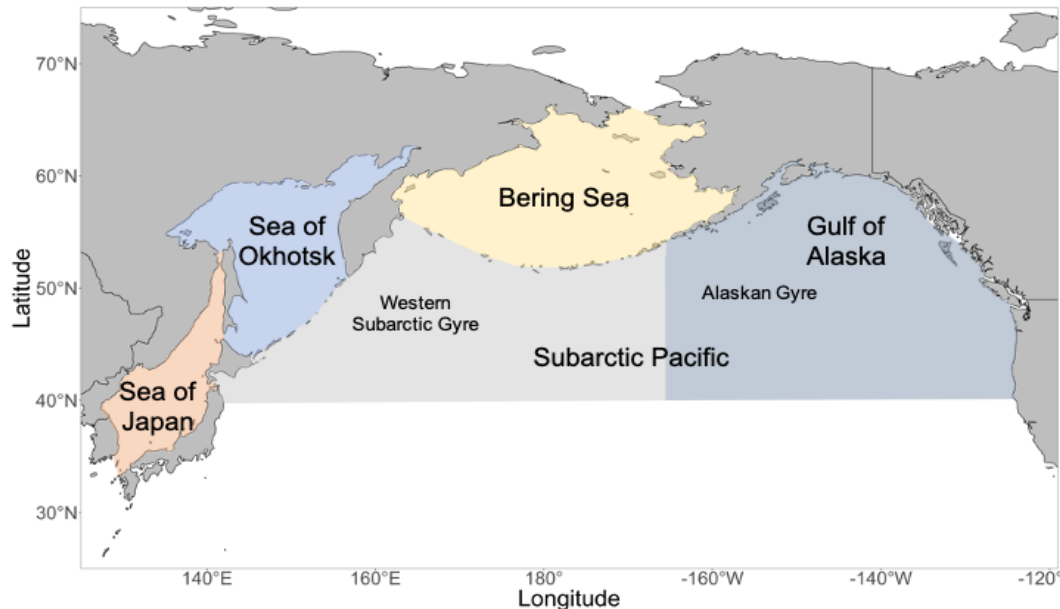
# How can we study the dynamic marine phase of the salmon life cycle?





# Objectives

- 1) Collate and make available historic data on salmon diets
- 2) Utilize this data to better understand the marine phase of the salmon life cycle across the North Pacific

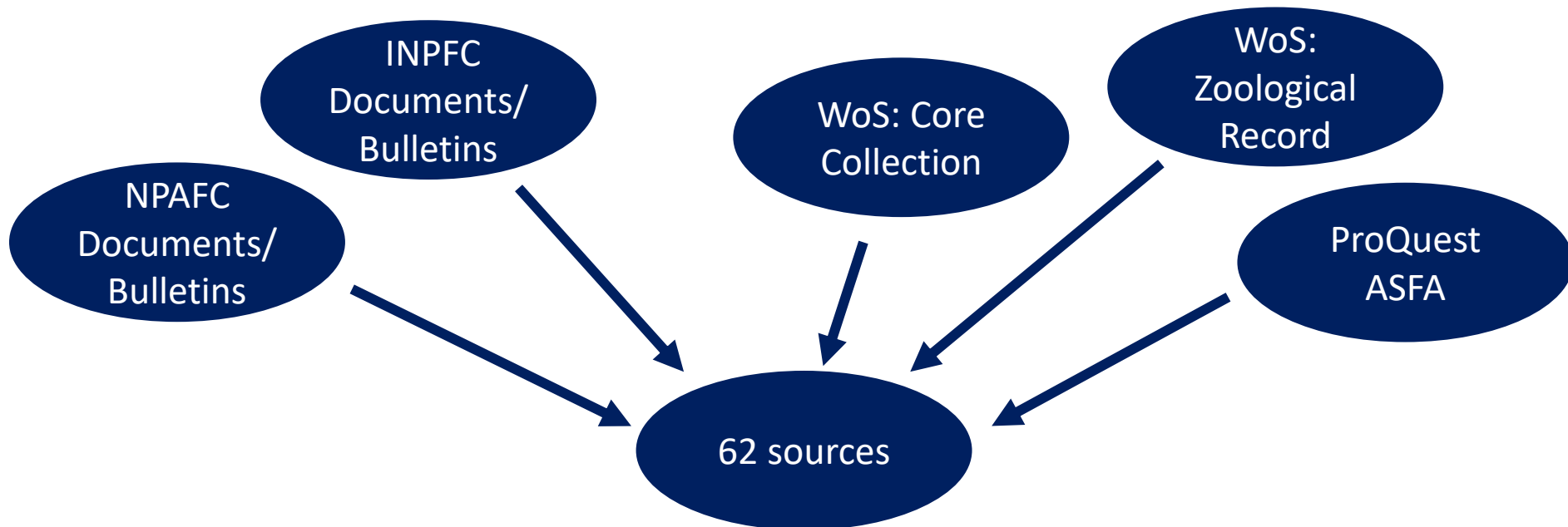


# Collate and Make Available Historic Data

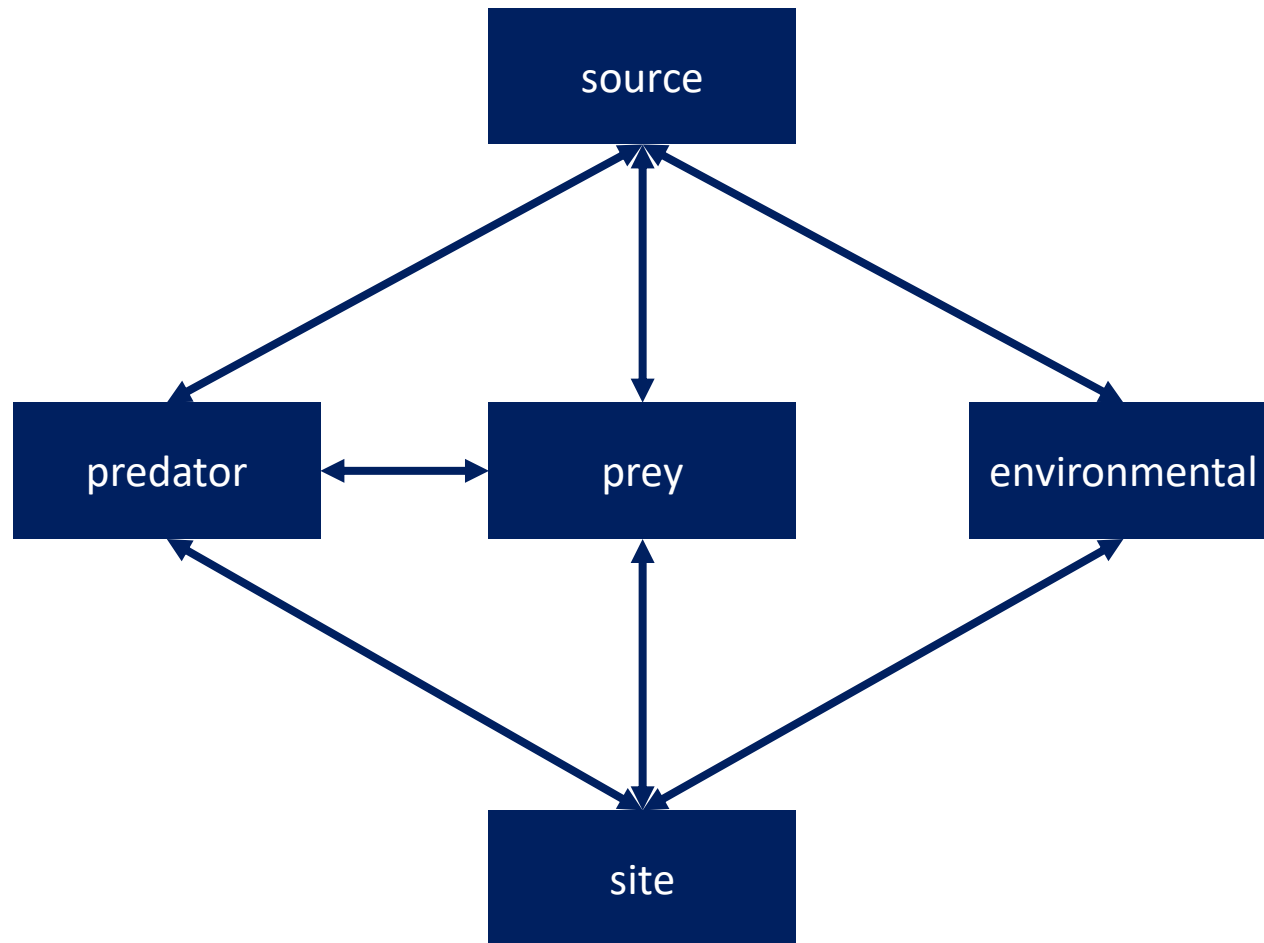
- 1) Systematic literature review
- 2) Data extraction (first round: 1959-69; 1987-97)
- 3) Relational database creation

Manual Search

Keyword Search



# North Pacific Marine Salmon Diet Database



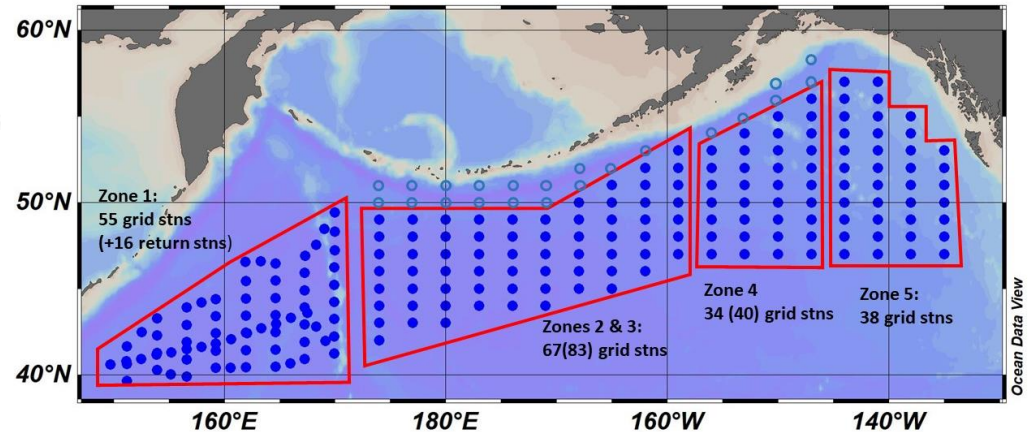
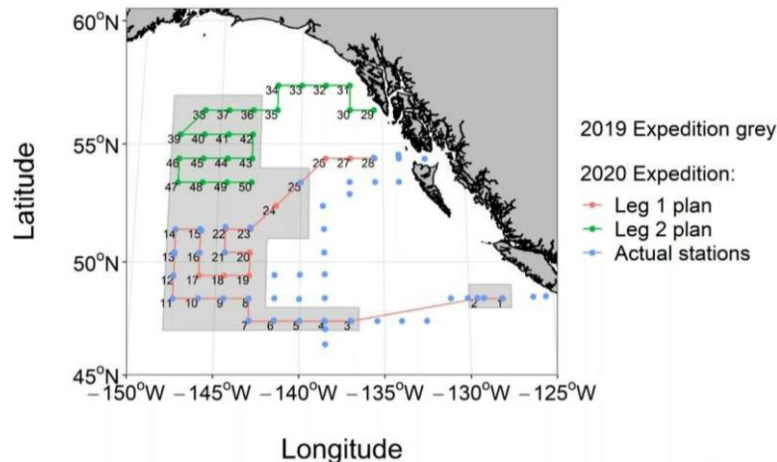
**Publication:** Graham, C., Pakhomov, E.A. & Hunt, B.P.V. A salmon diet database for the North Pacific Ocean. *Sci Data* 7, 332 (2020). <https://doi.org/10.1038/s41597-020-00676-y>

**Database Available:** [https://github.com/mcarolinegraham/North\\_Pacific\\_Marine\\_Salmon\\_Diet\\_Database](https://github.com/mcarolinegraham/North_Pacific_Marine_Salmon_Diet_Database)



# International Year of the Salmon: High Seas Expeditions

- Successful 2019 and 2020 International Gulf of Alaska Expeditions
- In 2022 there will be an IYS Pan-Pacific Winter High Seas Expedition
- More information here: <https://yearofthesalmon.org/high-seas-expeditions/>



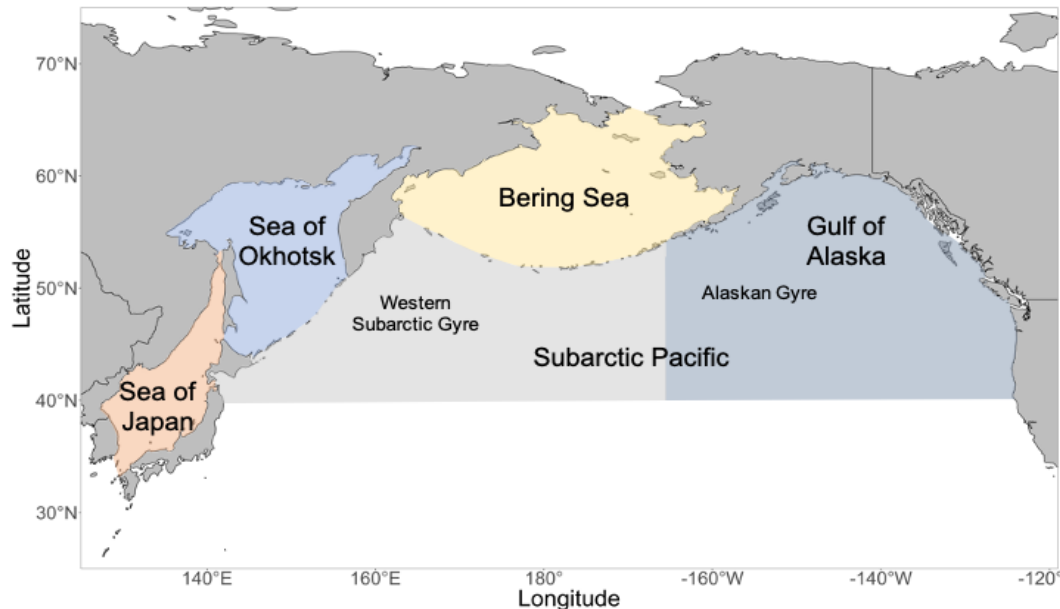
# International Year of the Salmon: Data Mobilization

- Data mobilization is a key part of the 2019, 2020 and 2022 IYS Expeditions
- Working with the Hakai Institute to develop a GOOS-compliant system (Global Ocean Observing System) to federate High Seas Expedition data and some historic data as well
- This data is currently being collated and standardized and will be publicly available in the near future



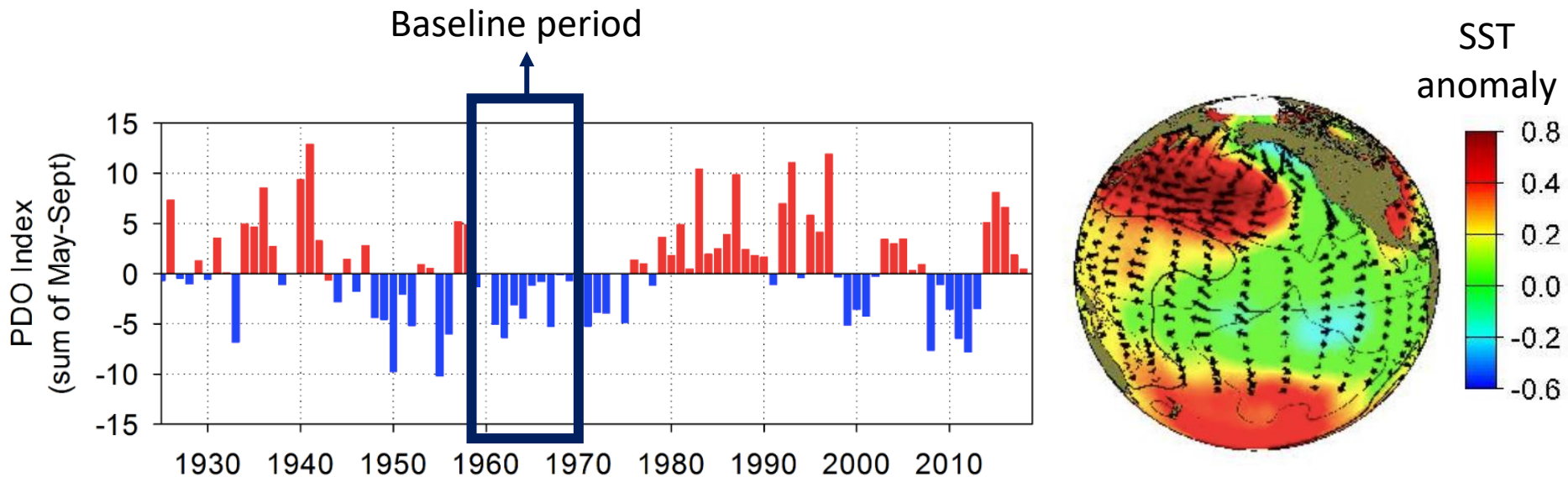
# Objectives

- 1) Collate and make available historic data on salmon diets
- 2) **Utilize this data to better understand the marine phase of the salmon life cycle across the North Pacific**

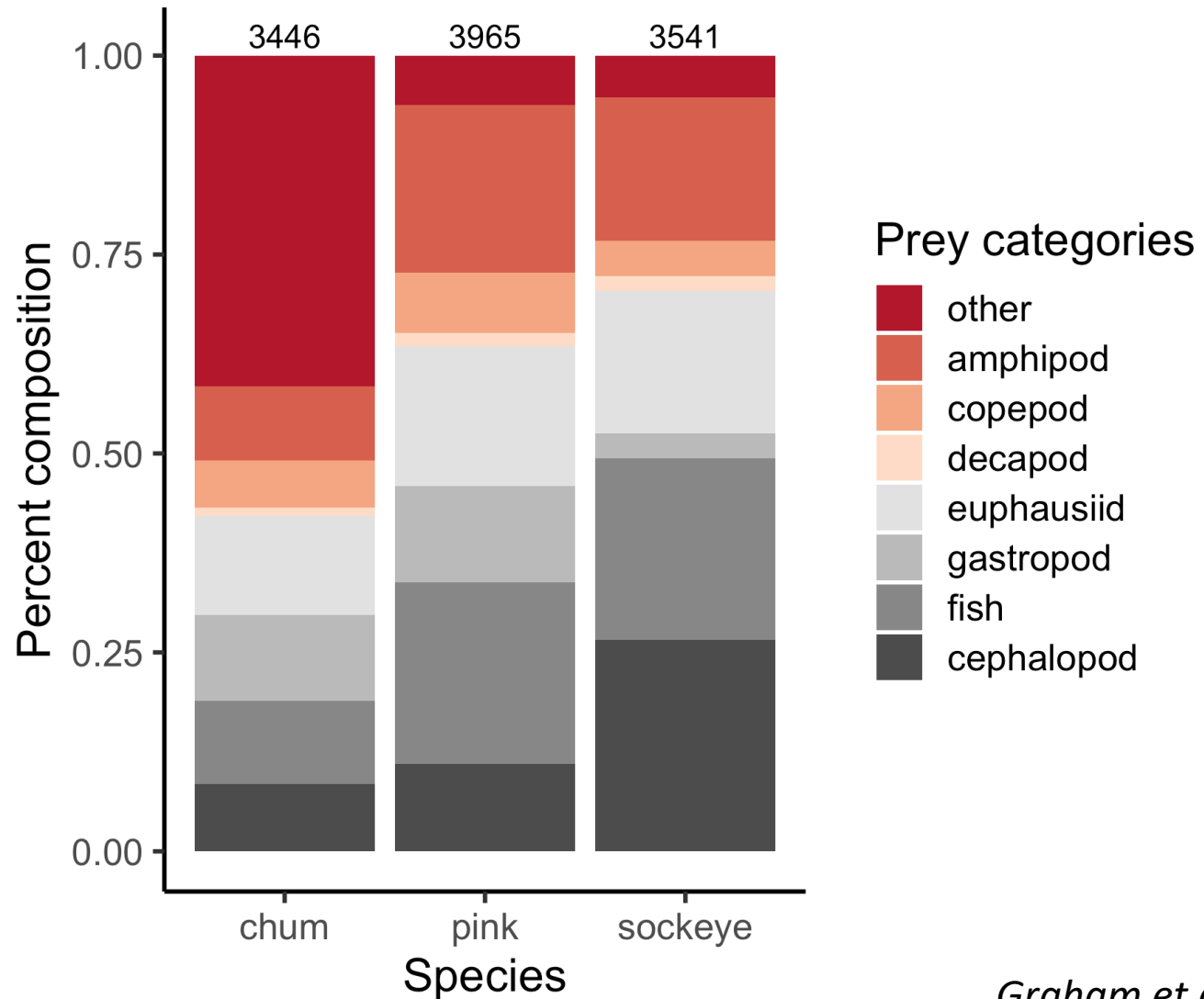


# Research Question

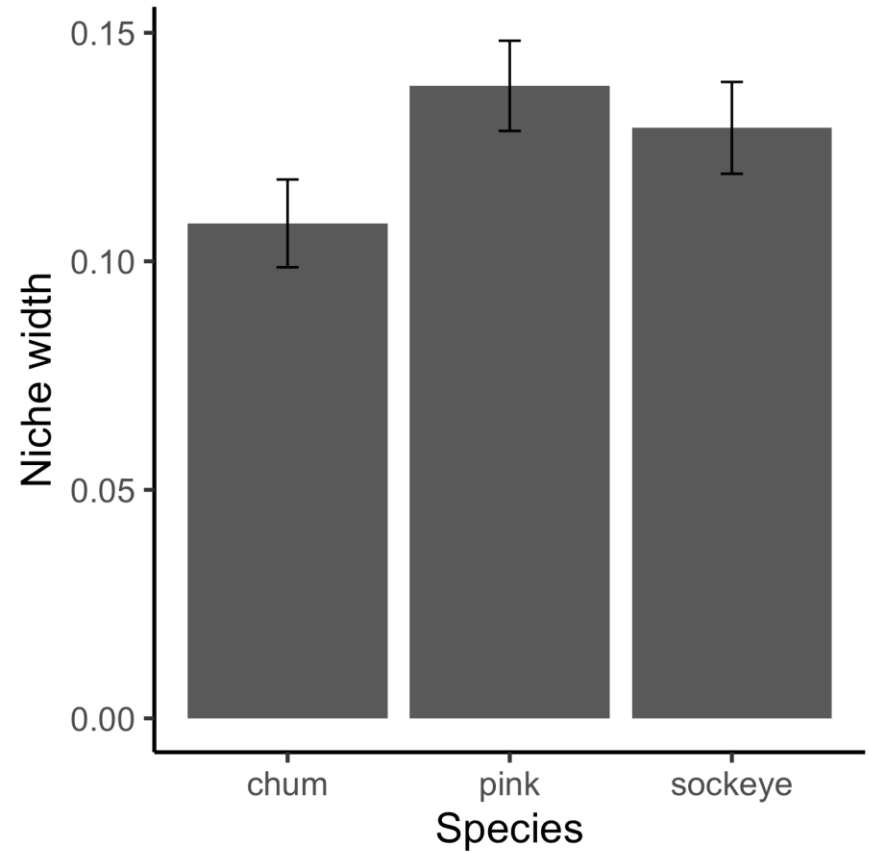
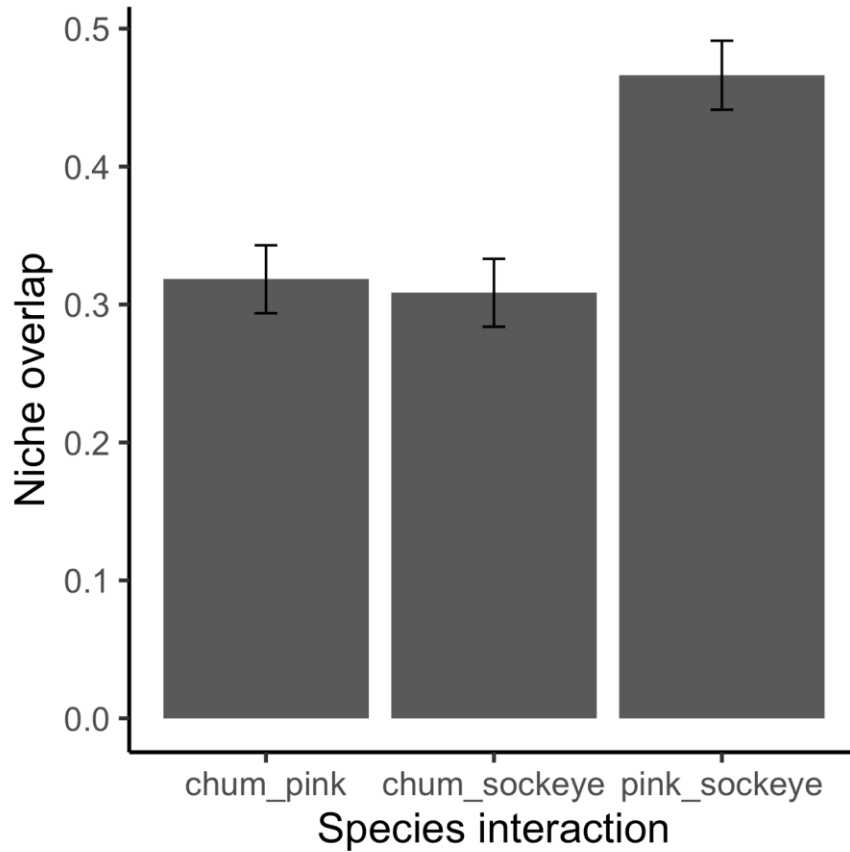
What are the baseline **interspecies** and **spatial** differences in diet and trophic niche between pink, chum and sockeye across the North Pacific?



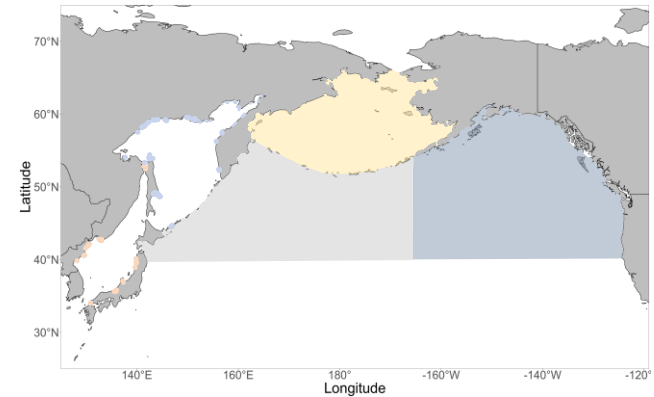
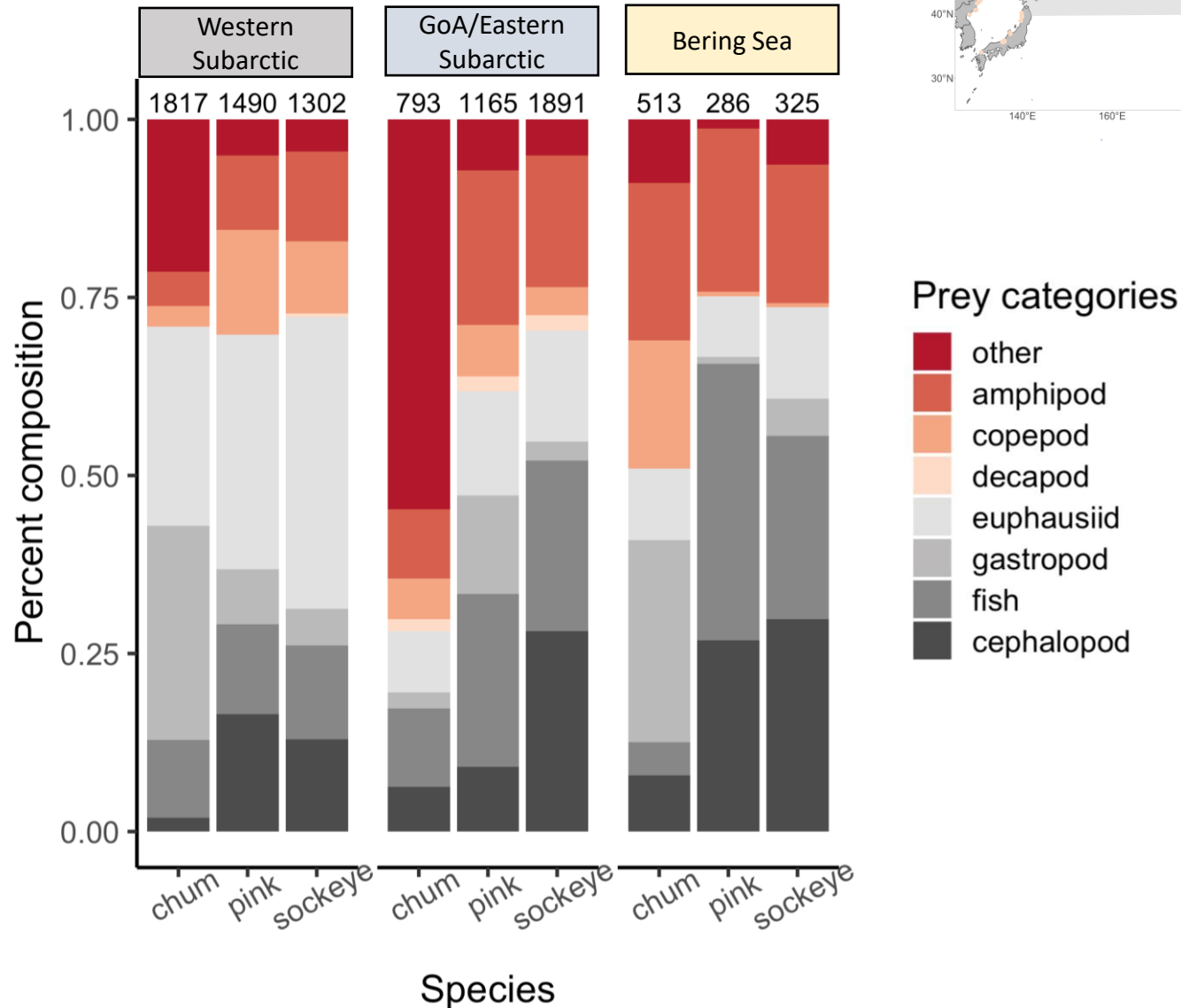
# Interspecies Diet Differences



# Interspecies Trophic Niche Differences

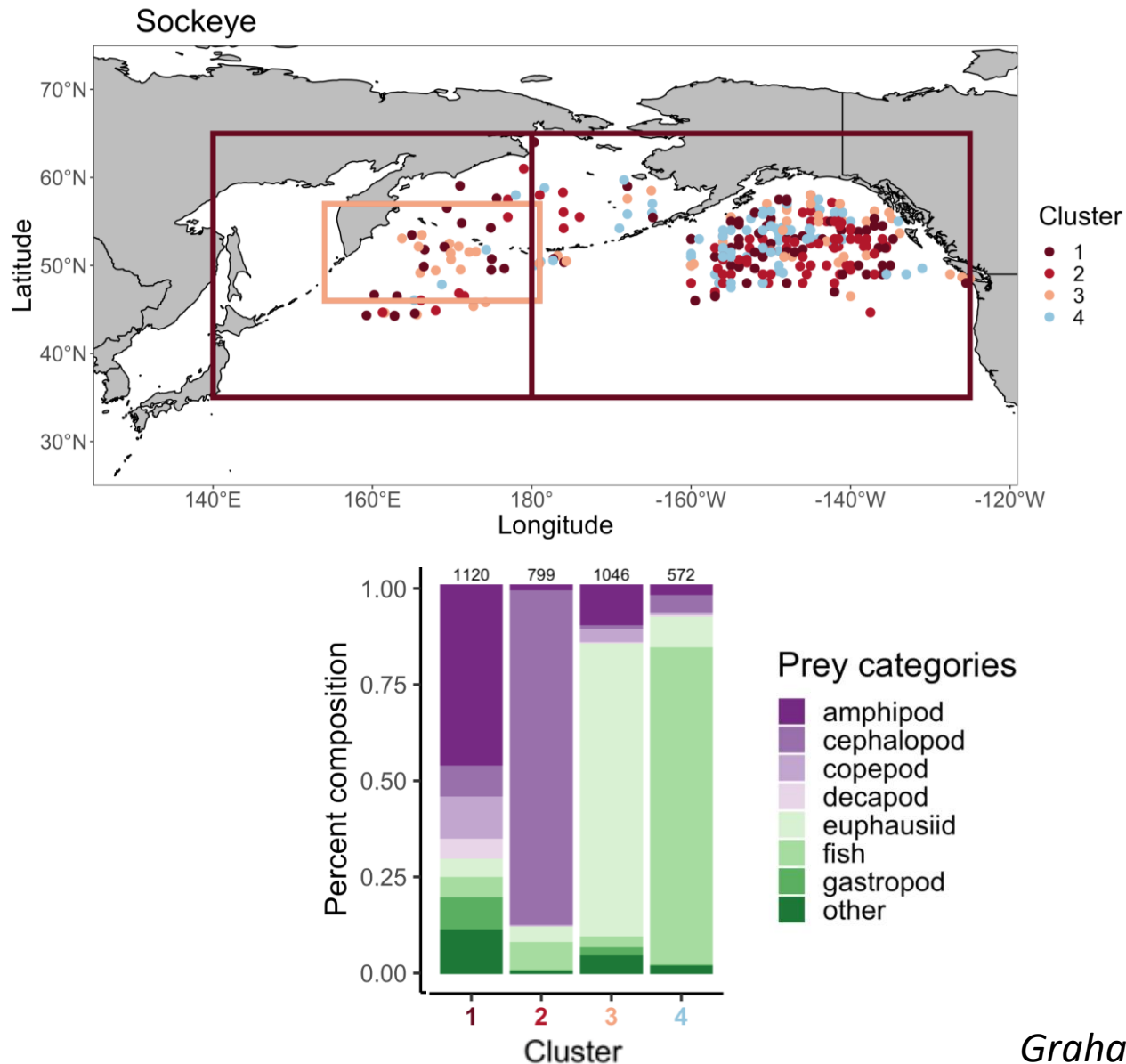


# Large-scale Spatial Differences

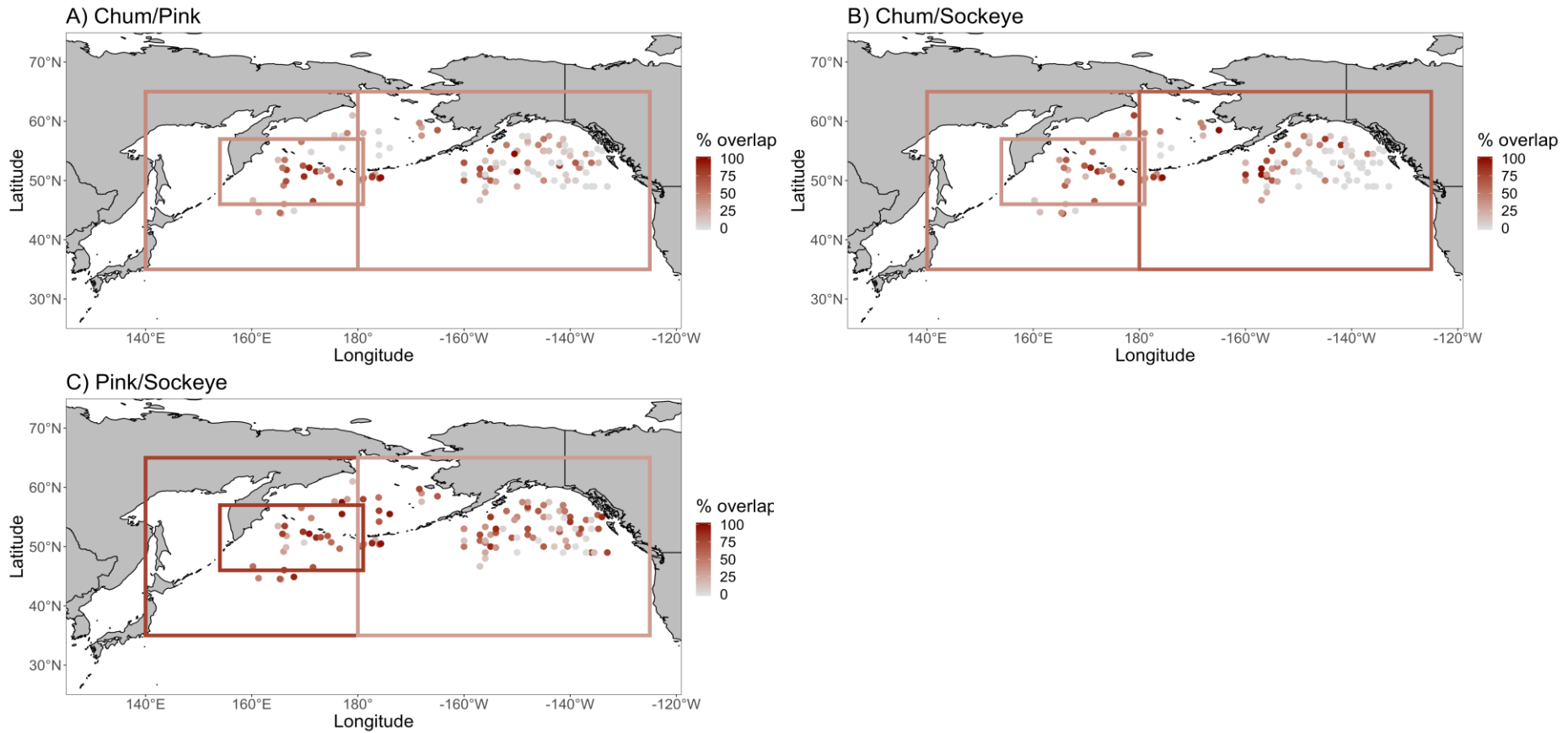




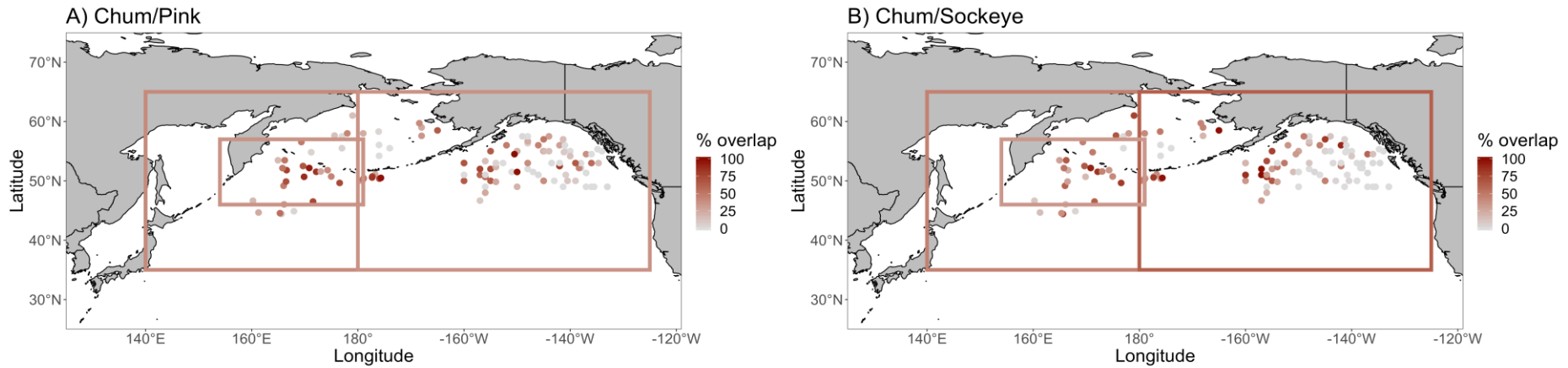
# Fine-scale Spatial Differences



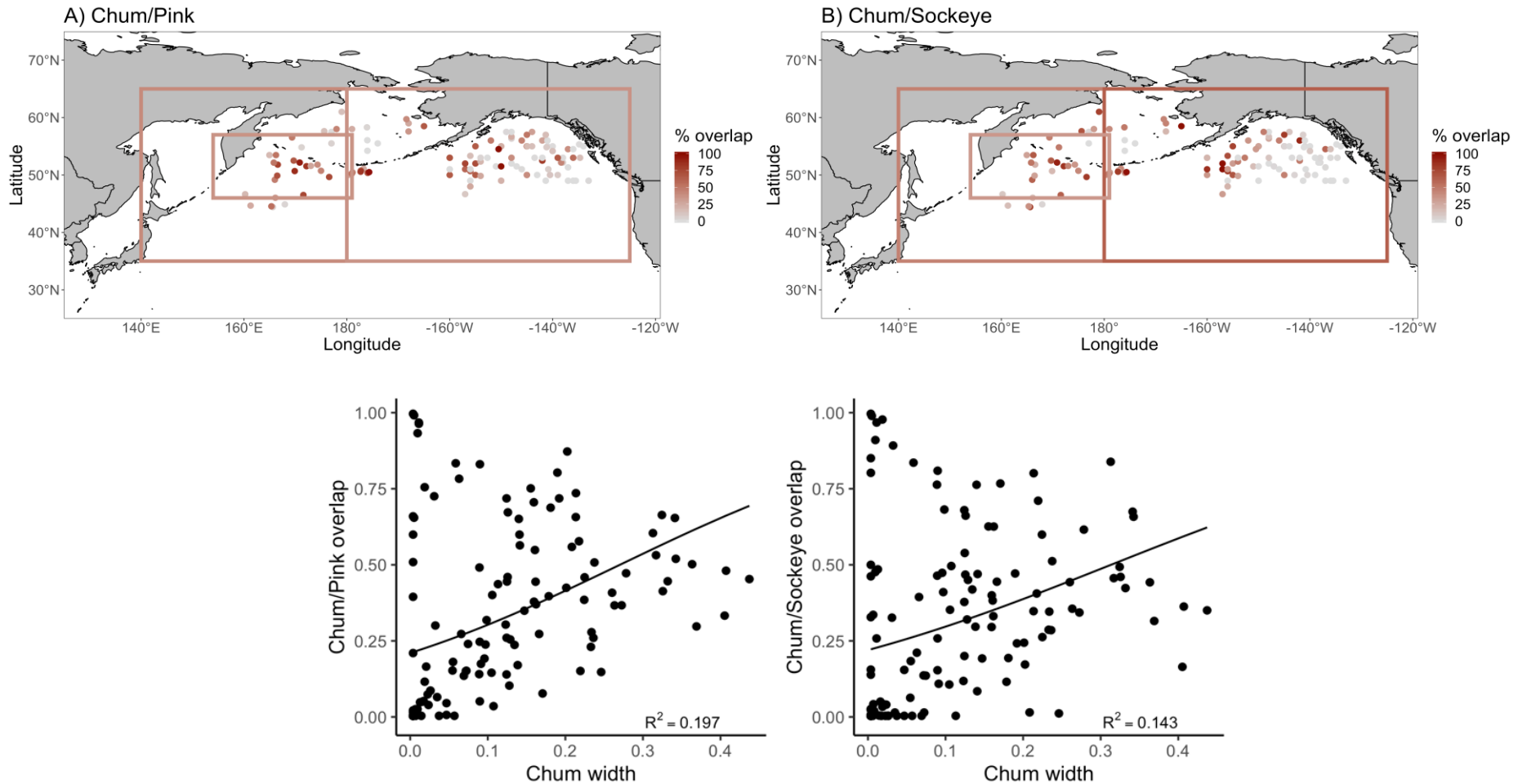
# Fine-scale Niche Differences



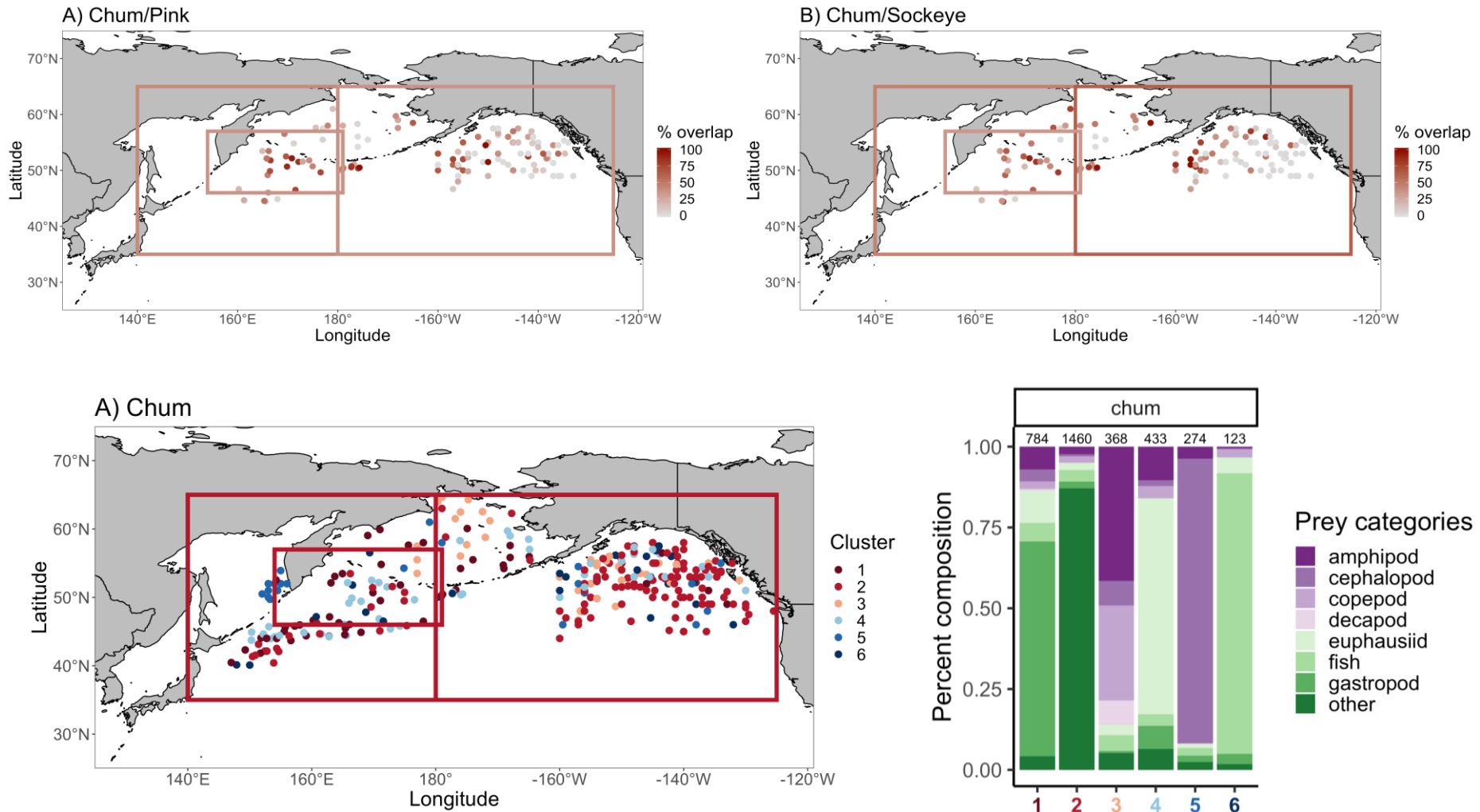
# Fine-scale Niche Differences



# Fine-scale Niche Differences

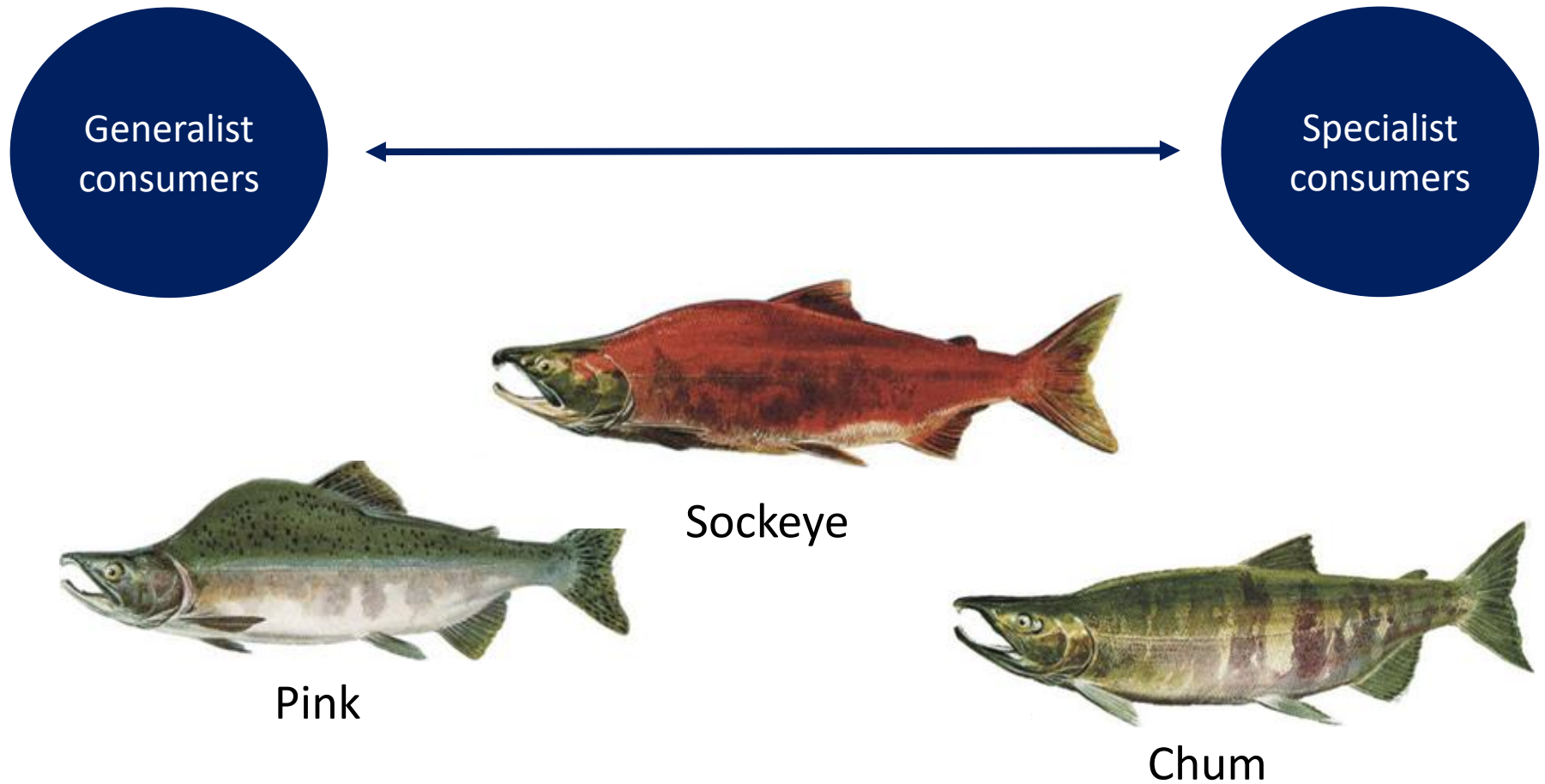


# Fine-scale Niche Differences



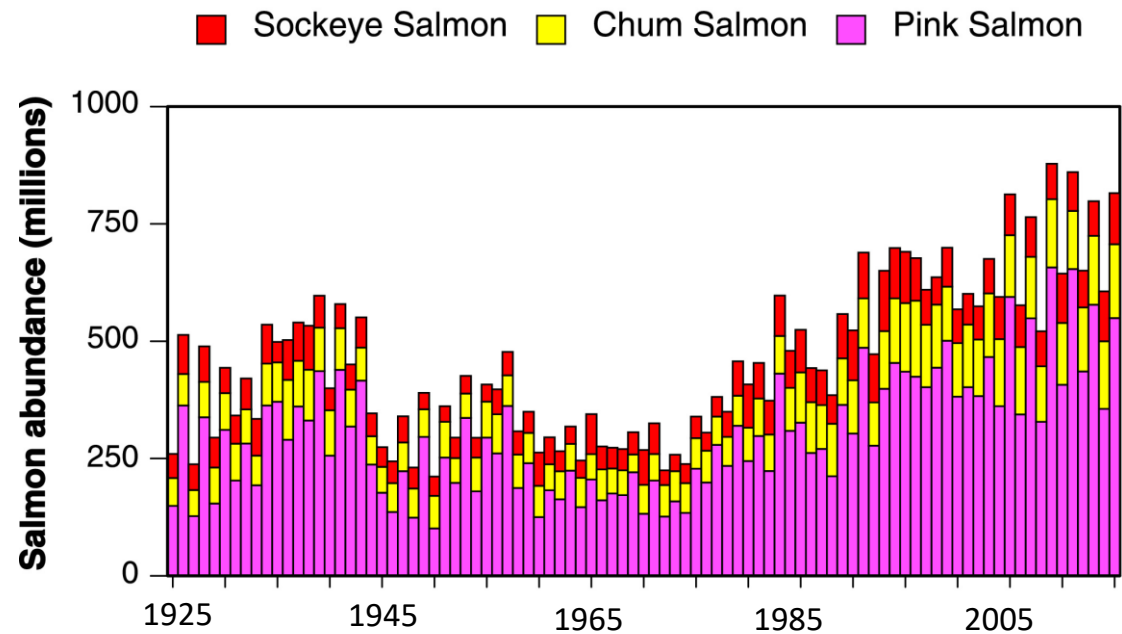
*Graham et al., in press*

# Summary of Interspecies Differences



# What is the relevance of 1960s data to the present?

- Baseline conditions help us better understand changes in ocean conditions and salmon production
- Already some evidence of competition in the 1960s
- Temporal comparison could reveal the effects of changing ocean conditions on salmon





# Conclusions and Future Directions

- Built a database to house marine salmon diet data and encourage collaboration and research
- First application of this database to help further understanding of the understudied marine phase
- Future studies should analyze temporal diet data across the North Pacific to better understand how the past relates to the present and future of salmon



# Acknowledgements

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- **Data extraction:** Marina Espinasse, Carmen Manuel, Nicole Link
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Thank you!