Fine Dining with Southern Resident Killer Whales: Exploring Habitat Characteristics of Predation Locations

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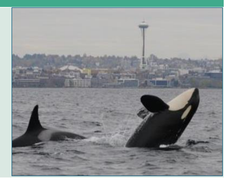
Introduction

Southern Resident Killer Whales (SKRW)



- Population of 70-75 individuals
- Fish eaters - mainly Chinook salmon
- Matriarchal society
- Endangered Species Act (ESA) listed in 2005
- Known range: southeast Alaska to central California
- This population has been studied in-depth for 40+ years

Critical conservation need:

Understanding the habitat use of SRKWs will inform protection efforts, which is especially important for animals with a core habitat as busy as the San Juan Islands

Research Objective:

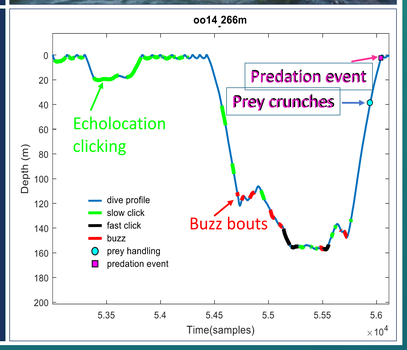
Identify marine habitat features predictive of SRKW foraging and prey capture

Data Collection

- As part of a predation study, whales were followed by boat through focal follows, where we
  - Observed behavior
  - Tagged a portion of whales
  - Collecting remains of predation such as tissue samples
- During the focal follows the location of tagged whales was geo-referenced to provide precise coordinates for later analysis

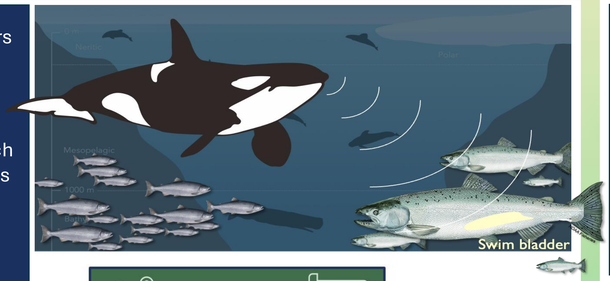
- **Dtags** (Digital acoustic recording tag)
  - These multi-sensor tags recorded the acoustic environment and the whales' movements, providing valuable data on their subsurface activities
  - They are like a fitbit for whales, with accelerometers, magnetometers and temperature and pressure sensors
  - Suction-cup attached to SRKW under research permits

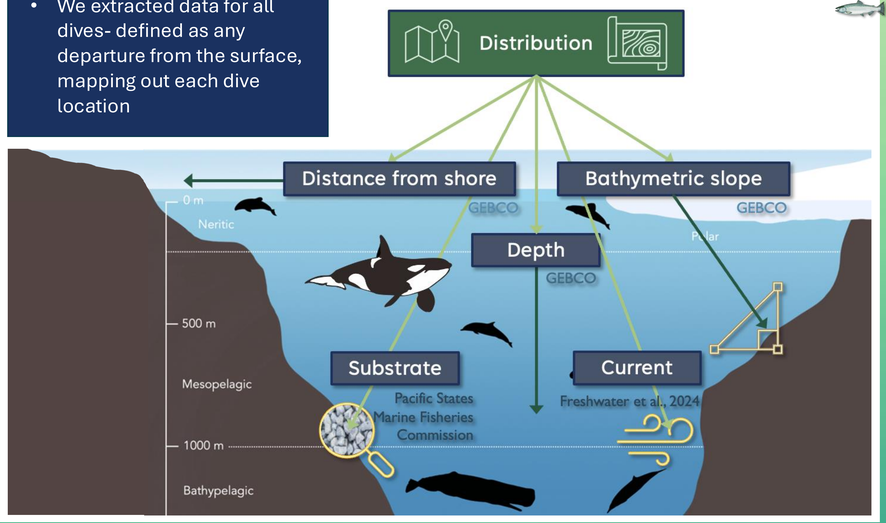
- **Dtag data** picked up different cues
  - Prey searching
  - Prey pursuit
  - Prey captures
- To validate feeding dives, we also collected evidence of fish kills during the focal follows
- Prey capture cues were corroborated with observed prey remains, such as pieces of salmon, helping us identify the species



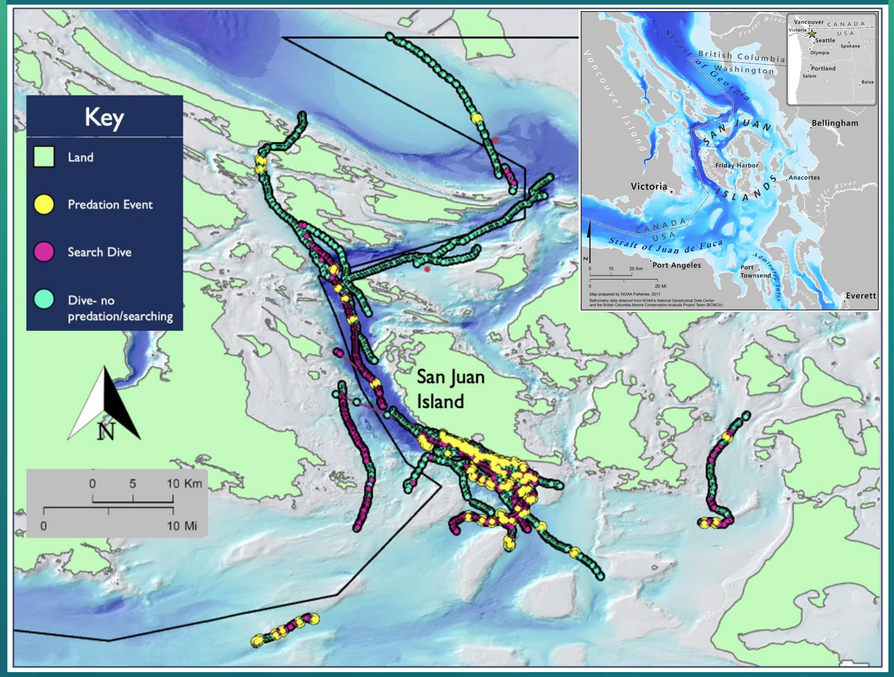
Modeling Foraging

- We compiled a list of factors that might be important to foraging
- Incorporating
  - environmental data, such as these selected factors
  - biological data, such as salmon abundance
- We extracted data for all dives- defined as any departure from the surface, mapping out each dive location



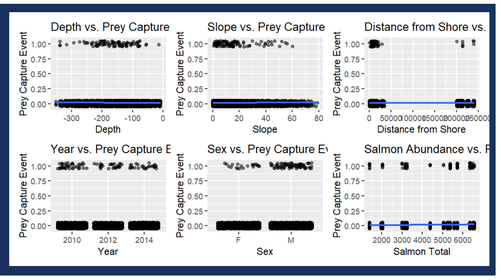


Predation Distribution



Preliminary Key Findings

- GLMMs
  - Using generalized linear mixed models to identify predictive factors
- What environmental factors are associated with
  - Searching for prey
  - Prey capture



Significant predictors of foraging activity as compared to other dives:

Deeper depths	Bathymetric Slope	Estimated salmon abundance	Current	Substrate	Males foraged further from shore than females
✓	✗	✗	?	?	✓

Broader Impact

Implications for Ecology		Conservation and Management		Broader Impact	
Behavioral Insights	Habitat Use	Informing Policy	Promoting Foraging Opportunities	Broader Impact	Anthropogenic Influence
Improved understanding of SRKW foraging behavior	Insights into how SRKW use their habitat seasonally	Data can guide habitat protection efforts	Focus on critical foraging habitats for conservation	Contribution to knowledge about marine predator-prey interactions	Contextualizing the impact of human activities on foraging success

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I am grateful to be working and living on land that is the unceded territory of the Duwamish Peoples, who have been stewards of this land and surrounding waters since time immemorial.

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