

Under the Waves

Tracking at-sea habitat use and dietary composition of the Pacific harbor seal in Oregon

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Introduction

Harbor Seals in Oregon

Harbor seals are a common but understudied marine mammal on the Oregon coast. There are ~10,000-12,000 harbor seals in OR.¹ Harbor seals are generalists, eating more than 100 species of fish and invertebrates.²



The at-sea spatial habitat use of harbor seals, and correlation of space use with diet has not been thoroughly examined in Oregon.

Our primary research questions were:

1. Where are areas of importance for seals in Oregon, and can we quantify unique life history strategies within our sample?
2. Are harbor seals utilizing marine reserves and wave energy sites as part of their home range? And how frequently do they visit these areas?
3. Do seals with a high degree of marine reserve use have unique diets?
4. Does isotope analysis allow us to estimate prey consumed by seals in OR?

Methods

To answer these questions, we attached Wildlife Computers SPOT5@ tags (shown above) to 24 adult seals in Netarts and Alsea Bays, OR to track their movements.

To estimate diet, I collected **one whisker from each animal**, and conducted stable isotope analysis of Carbon-13 ($\delta^{13}C$) and Nitrogen-15 ($\delta^{15}N$). I compared these values to muscle of fish collected by ODFW and NOAA.

I used **generalized models** to estimate which environmental variables contributed to habitat use, and **cluster analyses** to group seals by habitat use and isotopic composition to estimate foraging 'groups'.

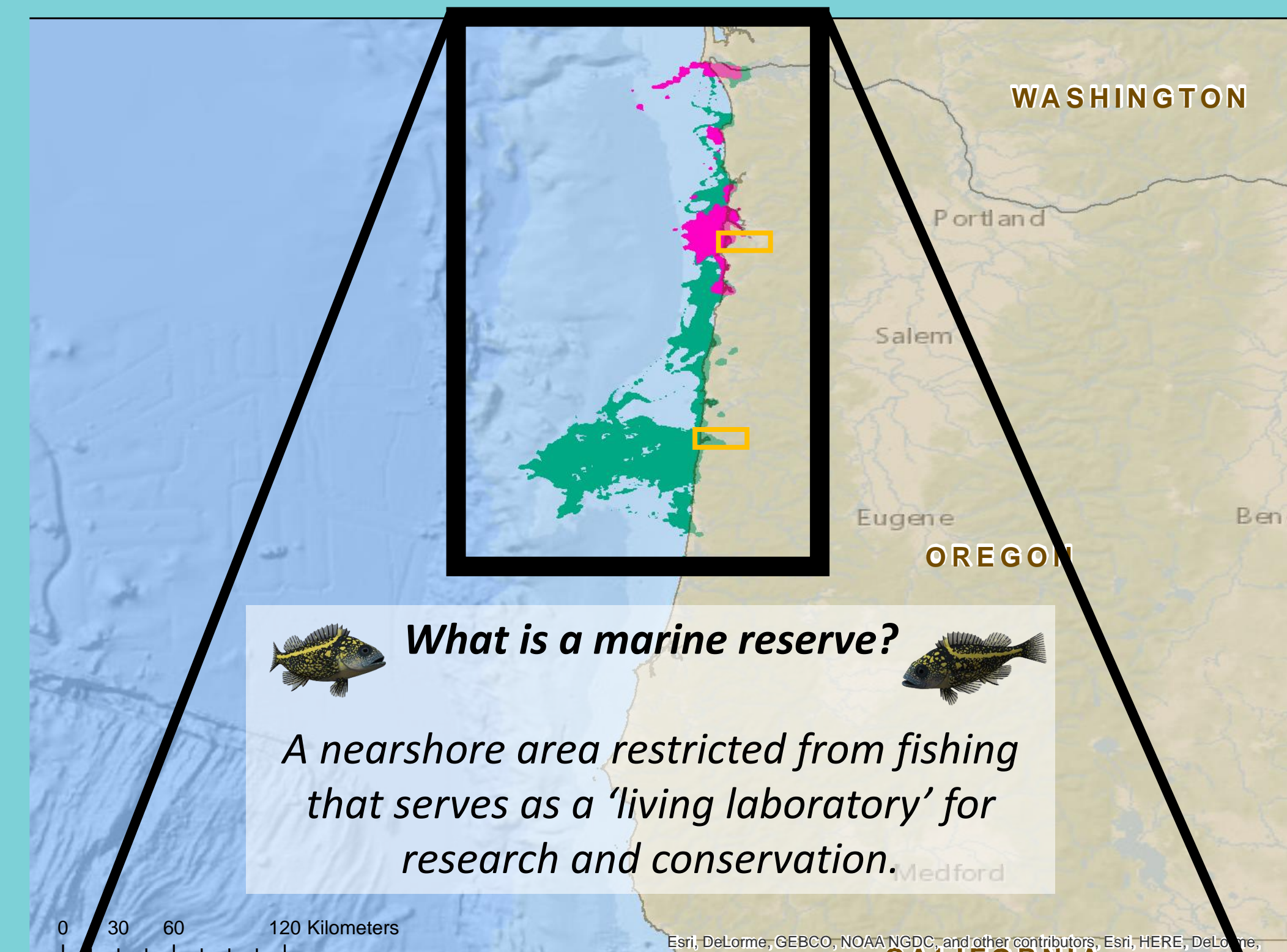
How do you catch seals?



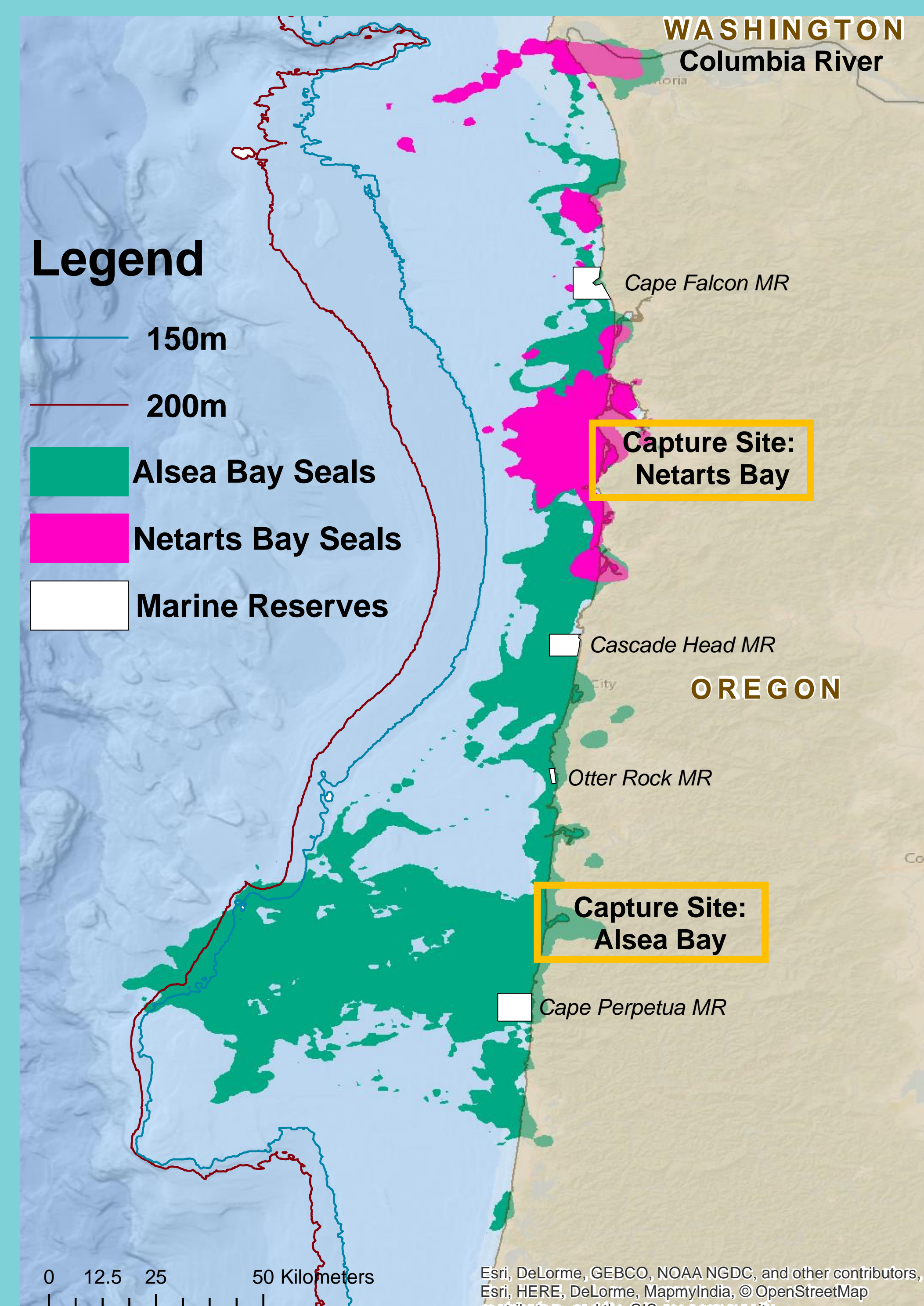
Adult seals were captured using a 'beach rush' method- two small skiffs were driven to shore near where animals were hauled out (resting on land). Researchers individually captured animals with hoop nets. Seals were weighed and then temporarily restrained for ~10 minutes while we attached external tags to the head with quick-setting epoxy.

These tags began transmitting as soon as the animals entered the water, and provided a location when they surfaced until the tag was naturally molted.

The Oregon Coast



The Oregon coast. Harbor seals traveled along the continental shelf, between the Columbia River and Florence, OR.



Home range for all 24 animals. Seals were temporarily captured and fitted with transmitters in Netarts and Alsea Bays, Oregon.

Spatial Habitat Use

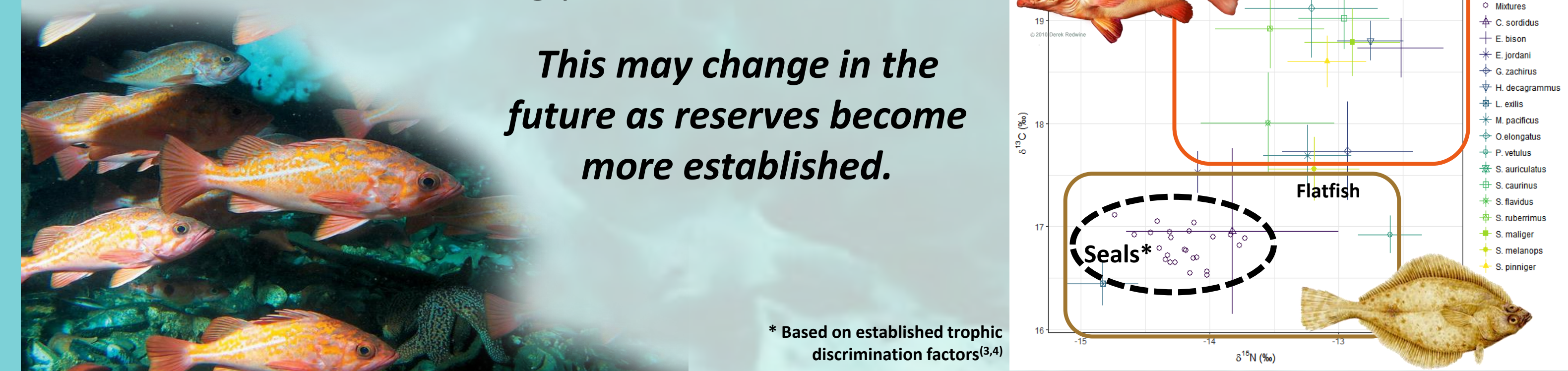
- Data were filtered and corrected and provided in total **57,220 locations** over 606 days.
- Seals nearly exclusively utilized the **continental shelf**, and spent an average of 42% of their time within bays or river sites.
- Only 1.3% of seals' time was spent within **marine reserves**, but some individuals spent up to 32% of their time within these areas.
- Seals were not present at **wave energy test site areas**, an important consideration for the future as this may change.
- Some animals **traveled farther than 200km** in this study, from Alsea Bay to the Columbia River.



Dietary Composition

****Thank you to my donors! This chapter was largely funded by my ARCS Scholarship****

- Rockfish collected within marine reserves appeared to be too large for harbor seal consumption, suggesting these areas may not be foraging grounds of important for harbor seals in Oregon.
- Seals seemed to be strongly associated with flatfish.



Environment

- Data were filtered and corrected and provided in total **57,220 locations** over 606 days.
- Seals nearly exclusively utilized the **continental shelf** (depths <200m), and spent an average of 42% of their time within bays or river sites.
- The average home range for seals was 365 km², but this varied widely between 3.20km² to 1647.93 km².
- Cluster analysis suggested **2 distinct foraging strategies** ("Localized Foragers" and "Long-Ranging Foragers") based on distance from shore, range in latitude and longitude, home range size, and $\delta^{13}C$.

Cluster Group	Mean km from Shore	Mean Lat.	Range Lat	Range Long	Home Range (km ²)	Mean $\delta^{13}C$
"Far Ranging"	9.53	-124.17	0.77	0.791	671.63	-14.71
"Localized"	1.87	-124.04	0.28	0.27	145.06	-13.74
p-value	0.00493	0.01367	3.77e-8	0.02539	0.00343	0.0003

All marine mammal work was conducted under NOAA NMFS Permit #16991, and OSU/San Jose State IACUC.

Literature Cited

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