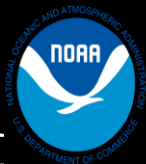


Traits-based Insights into Pelagic Food Webs under Climate Change



Stephanie J Green¹, Miram Gleiber¹, Zack Tandy¹, Alana Krug-Macleod¹, Elizabeth A Daly², Elan J. Portner³, C. Anela Choy³, Natasha A. Hardy¹, Zachary Roote¹, Caitlin J. Morganson¹, Iris George¹, Cindy Matuch¹, Cole B. Brookson¹, Barbara A. Muhling², Owyn Snodgrass², Travis Richards² and Larry B. Crowder⁴



**NOAA
FISHERIES**



Oregon State University
Hatfield

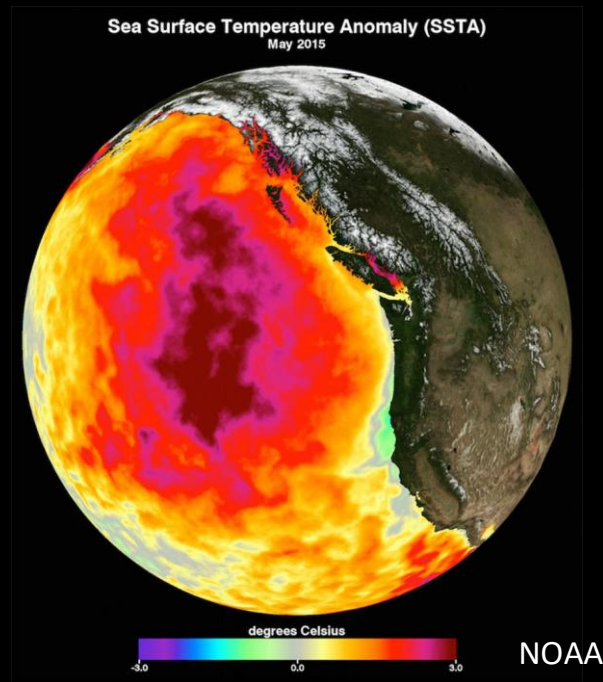
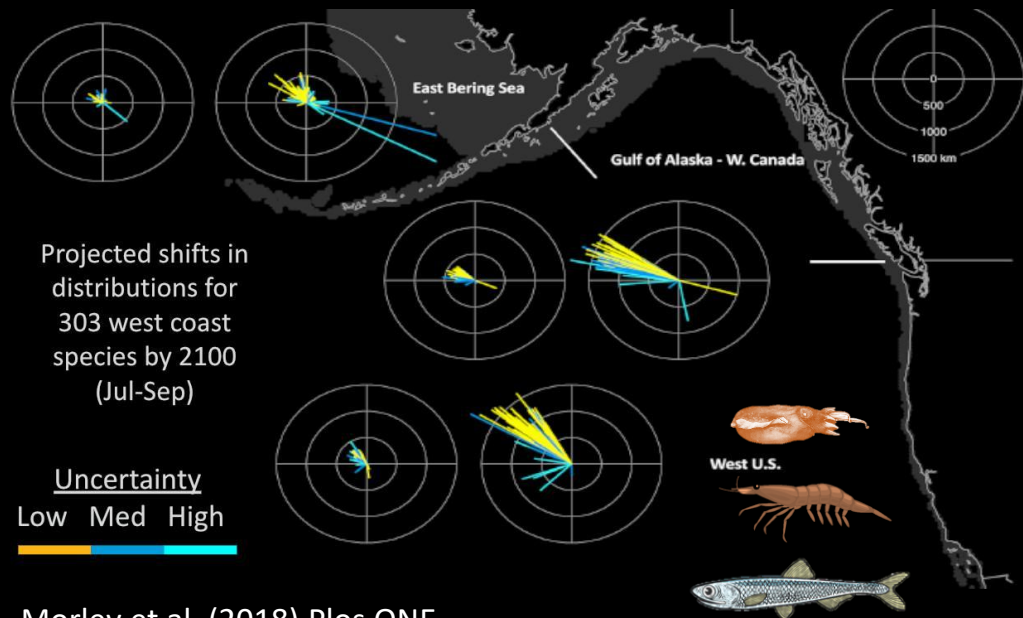


SCRIPPS INSTITUTION OF
OCEANOGRAPHY

UC San Diego

**Stanford
University**

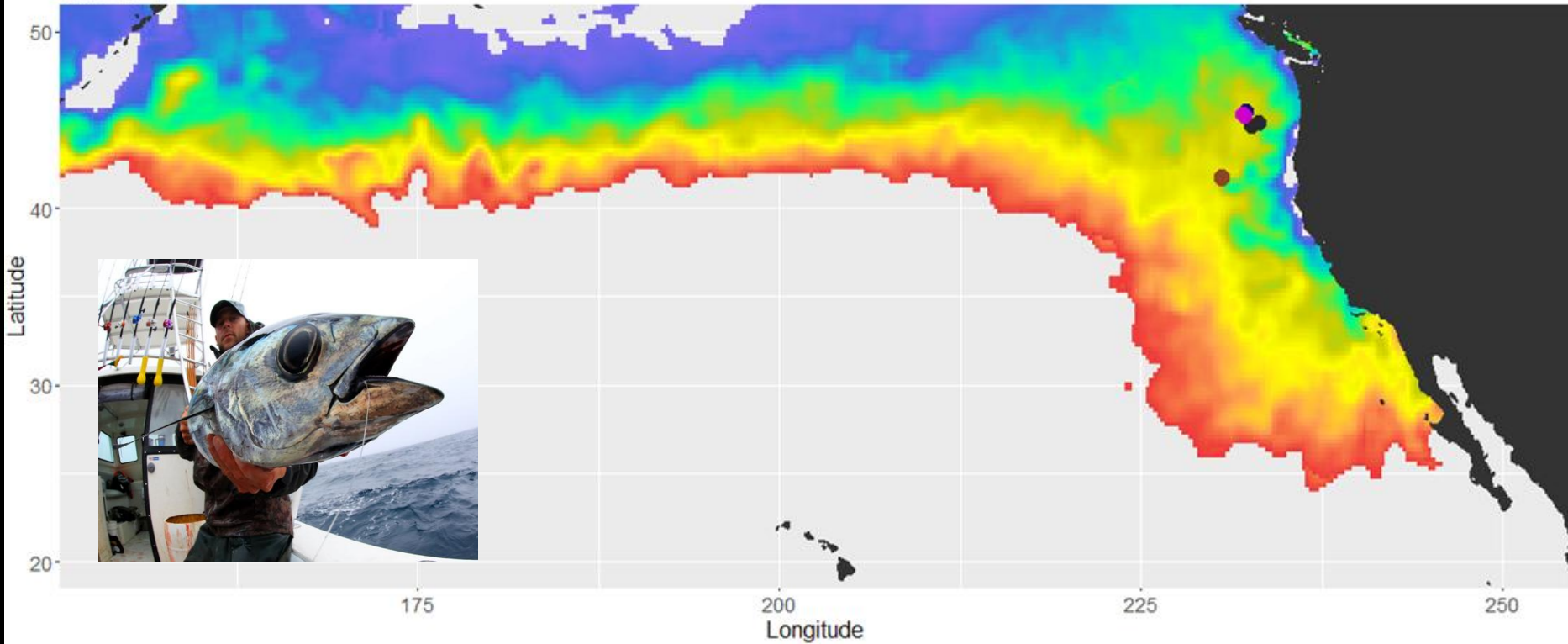
Variable climate-driven shifts projected for Pacific communities



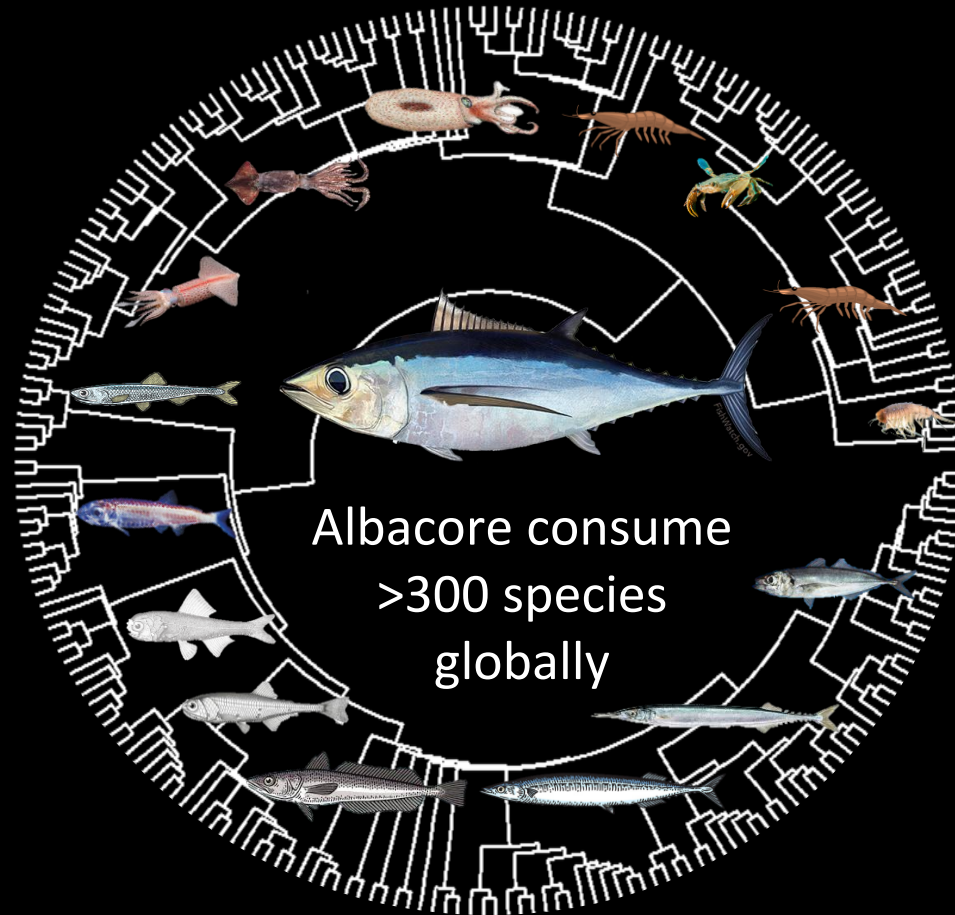
Implications for the predators and fisheries they support?

Albacore tuna

2011-09-02



Complex predator-prey interactions for pelagic predators



Predicting predator redistribution

Relate past
environmental
conditions and
species distributions

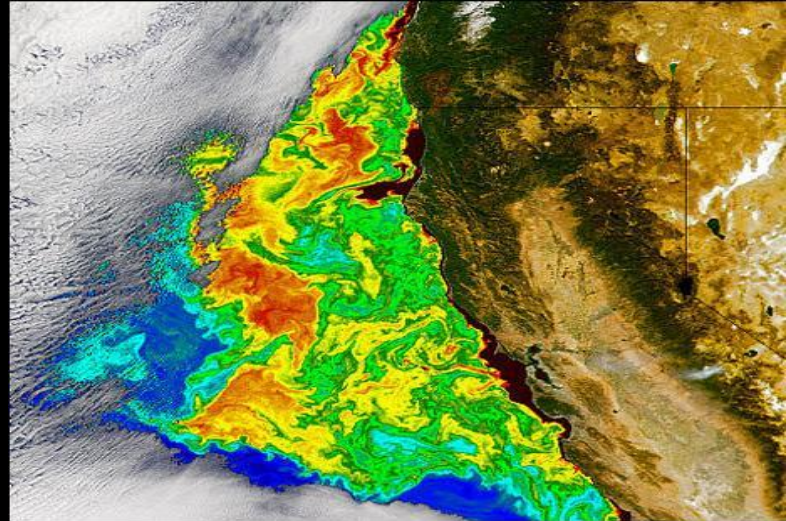


Infer future species
distribution
from predicted
environmental change



MCSI

+



NOAA

Predicting predator redistribution

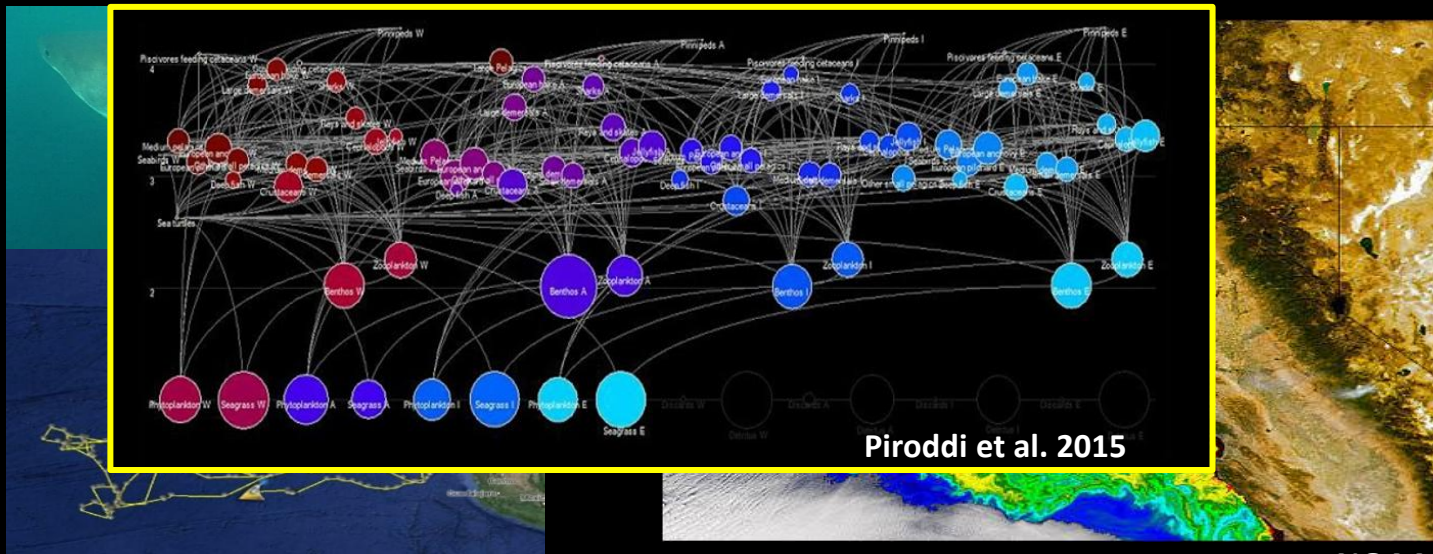
Relate past
environmental
conditions and
species distributions



Incorporate
effect of predator-
prey interactions
on abundance



Infer future species
distribution
from predicted
environmental change



MCSI

NOAA

As foragers, we don't see taxa....



crunchy

sweet

gluten free

High vitamin C

52 calories

\$1.25/each



soft

salty

gluten loaded

Low vitamin C

380 calories

\$3.99/each

As foragers, we don't see taxa....



crunchy

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High vitamin C

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soft

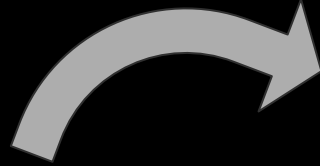
salty

gluten loaded

Low vitamin C

380 calories

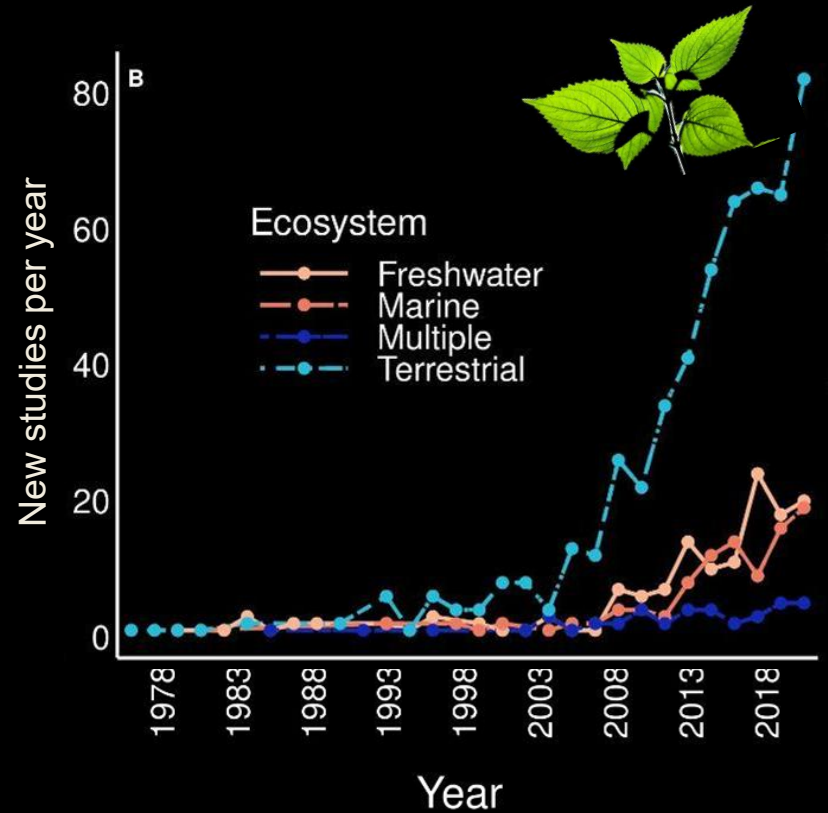
\$3.99/each



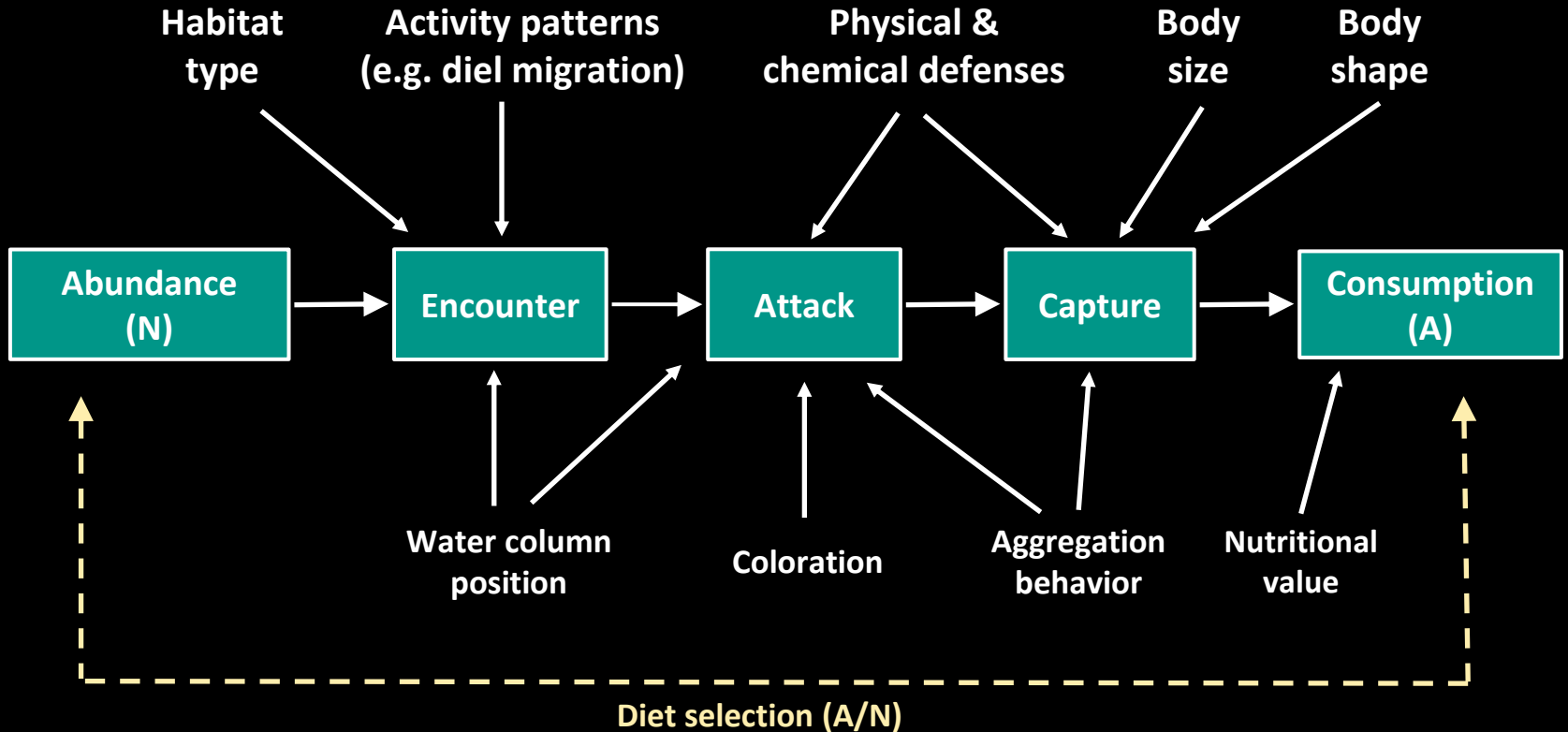
Traits could inform foraging in new contexts

As foragers, we don't see taxa....

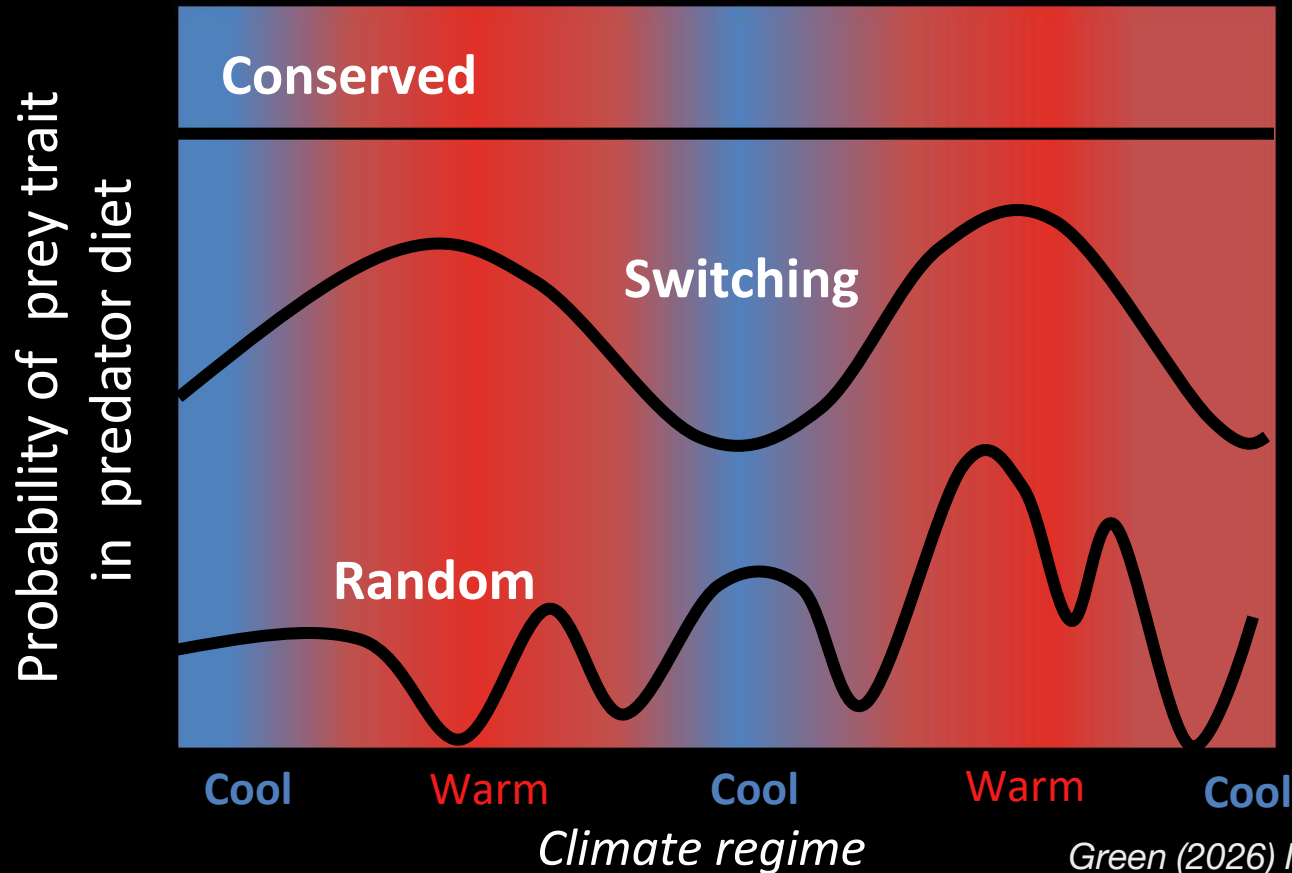
Trait-based analyses are on the rise



Traits mediating pelagic predator-prey interactions



Trait-based predictions for prey tracking



Objective:

Develop and test a framework for integrating trait-based prey interactions into forecasts of predator redistribution

Data synthesis

Database of traits relevant to pelagic predator foraging



Hindcast

Forage conditions under past climate states in the CCLME



Forecast

Predator redistribution under future scenarios

Pelagic Species Trait Database



- 43 traits from 532 species in 211 families globally
- adult and juvenile life stages



338



75



88



31

Trait Data Team



Miram Gleiber



Elan
Portner



Iris George



Alana Krug-MacLeod



Caitlin Morganson



Natasha
Hardy



Elizabeth
Daly



Anela
Choy



Zachary Roote



Cindy Matuch



Zack Tandy

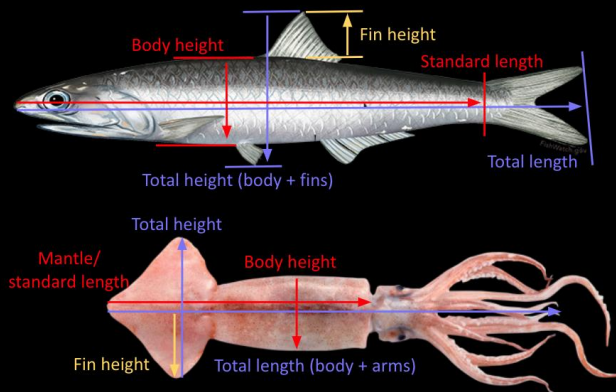
Collection Methods



Online resources



Literature search

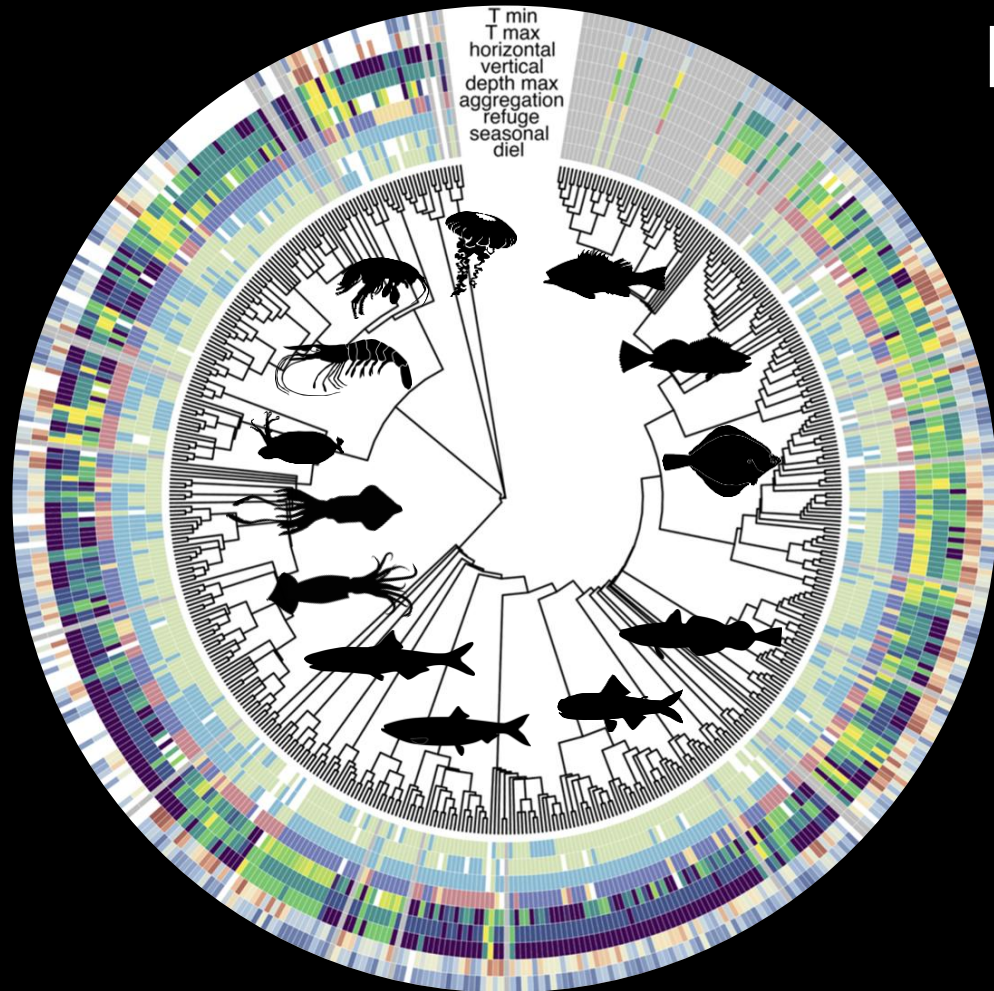


Morphometric measurements



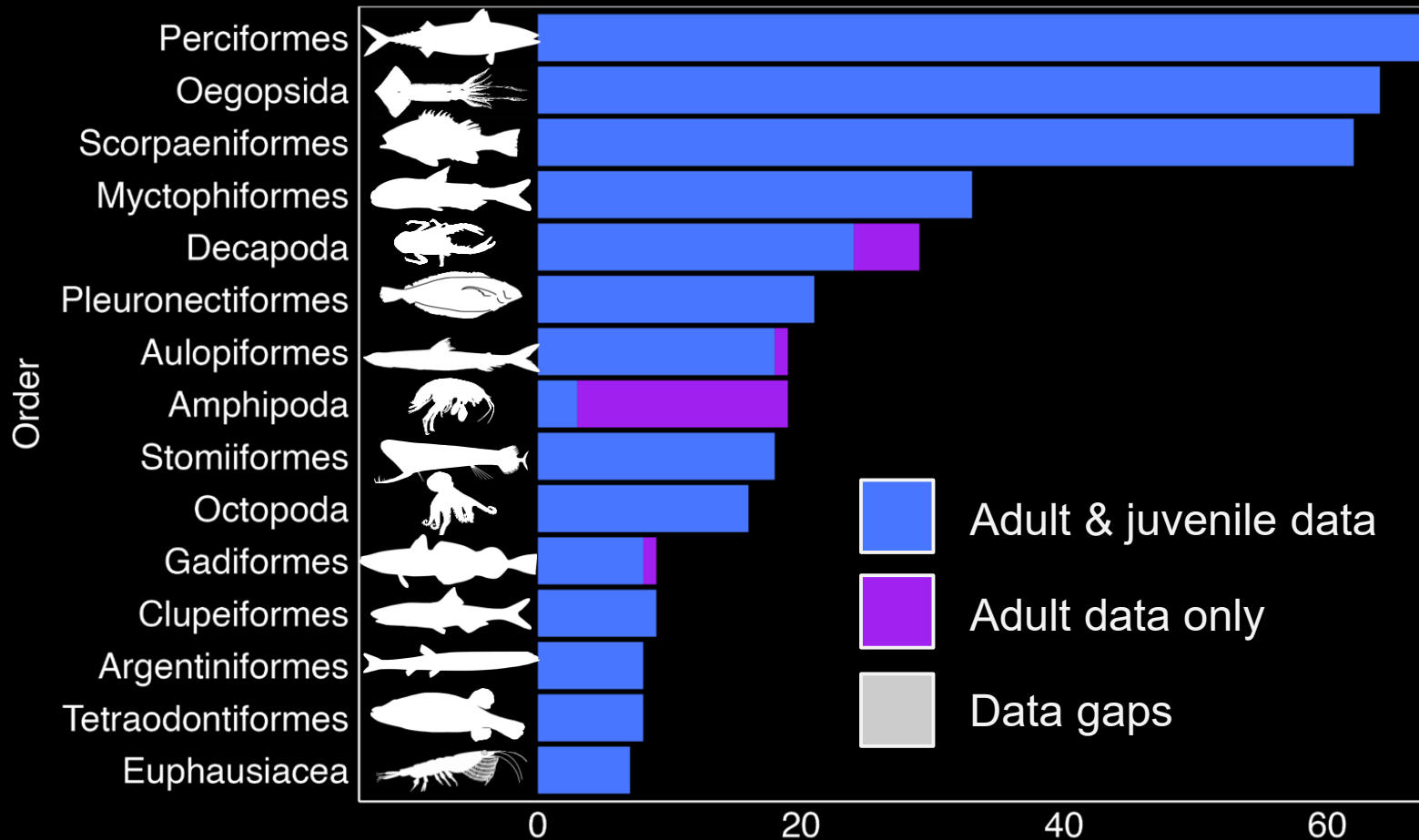
Nutritional quality analysis

Habitat & Behaviour



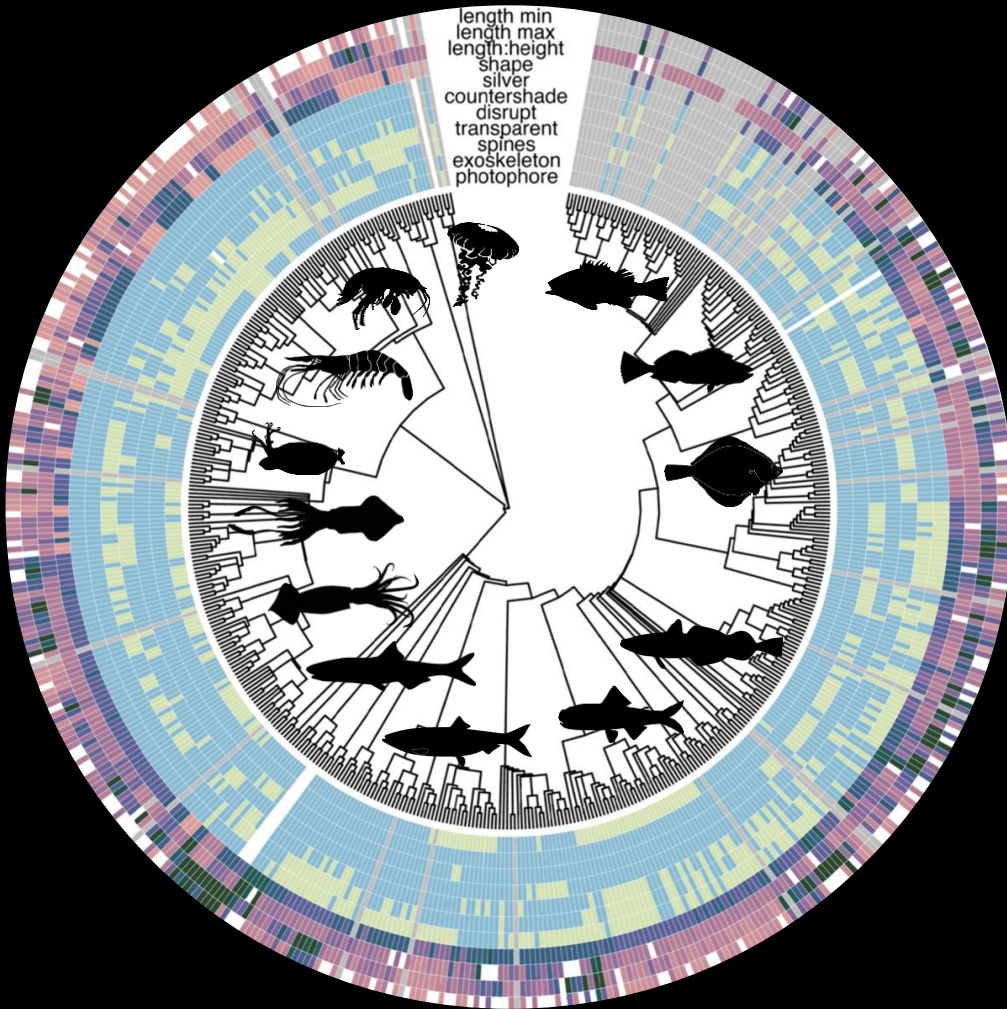
Horizontal habitat
Vertical habitat
Diel migration
Seasonal migration
Aggregation behavior

Vertical habitat

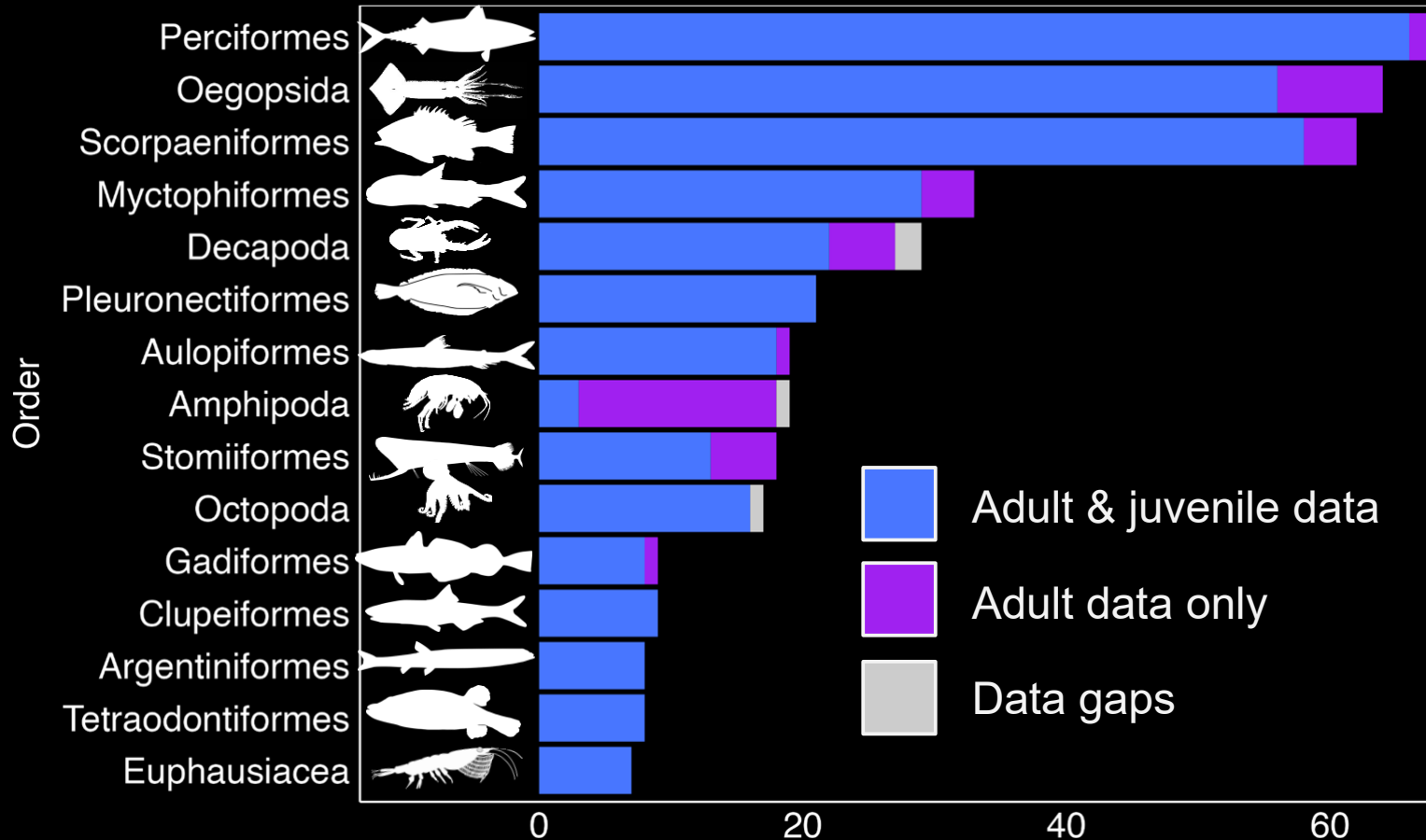


Morphology

Countershading
Silvering
Transparency
Physical defenses
Body shape (length:height)

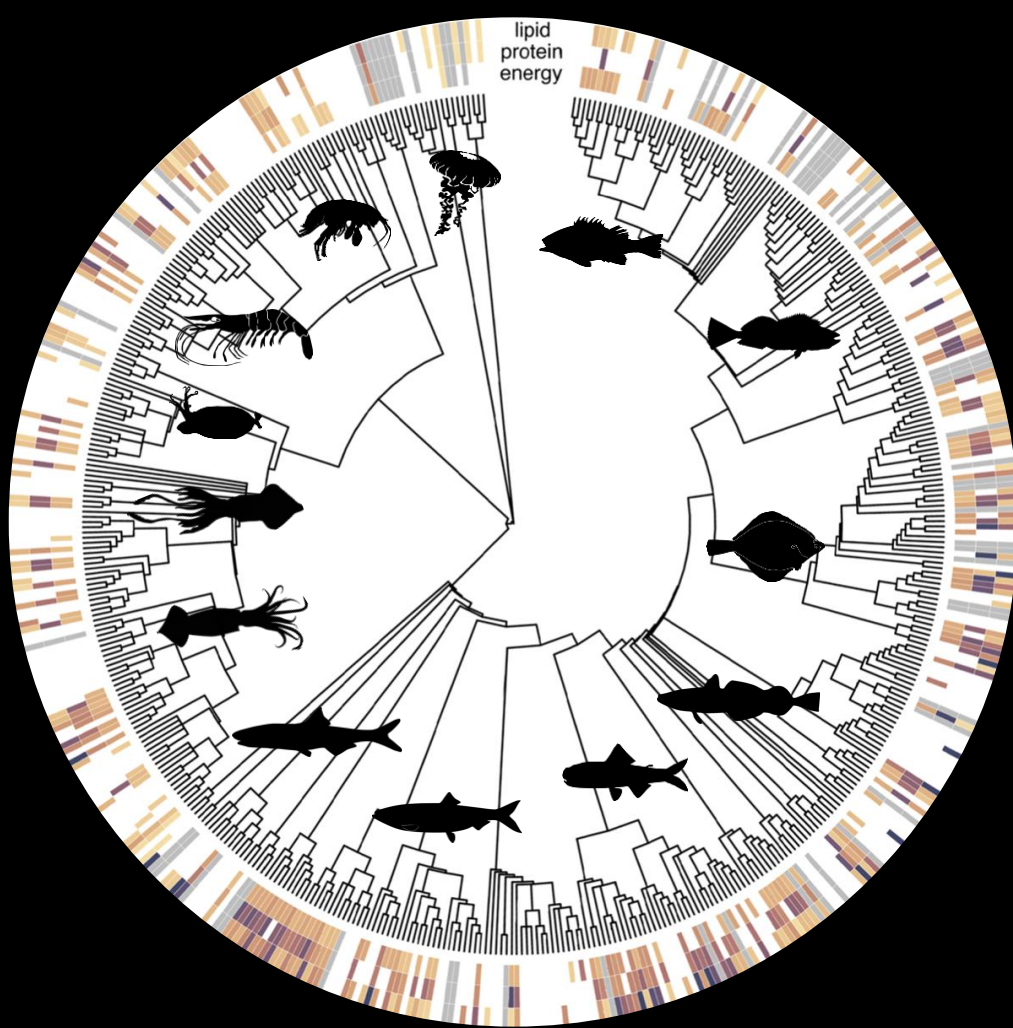


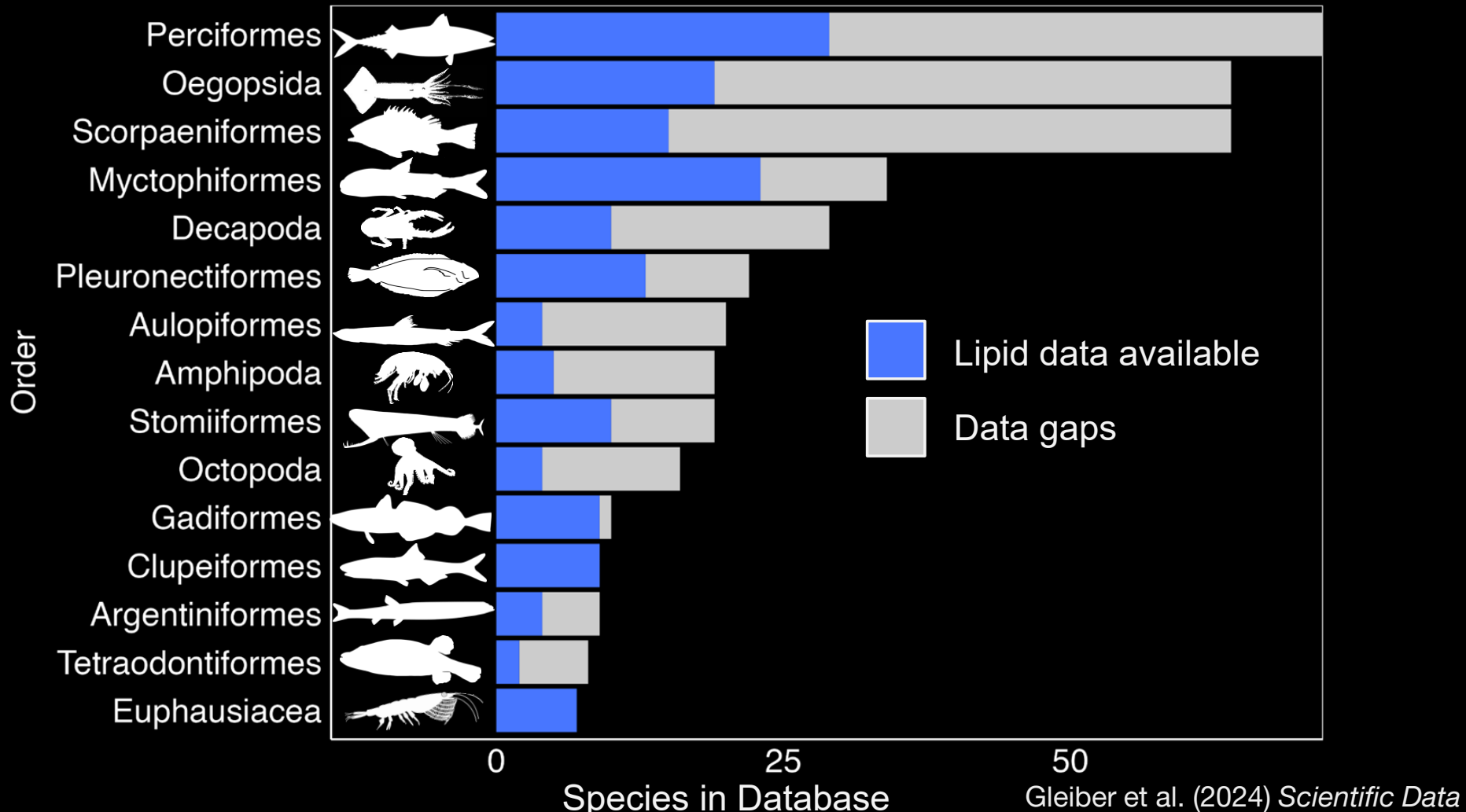
Body shape (SL:TL ratio)



Nutritional quality

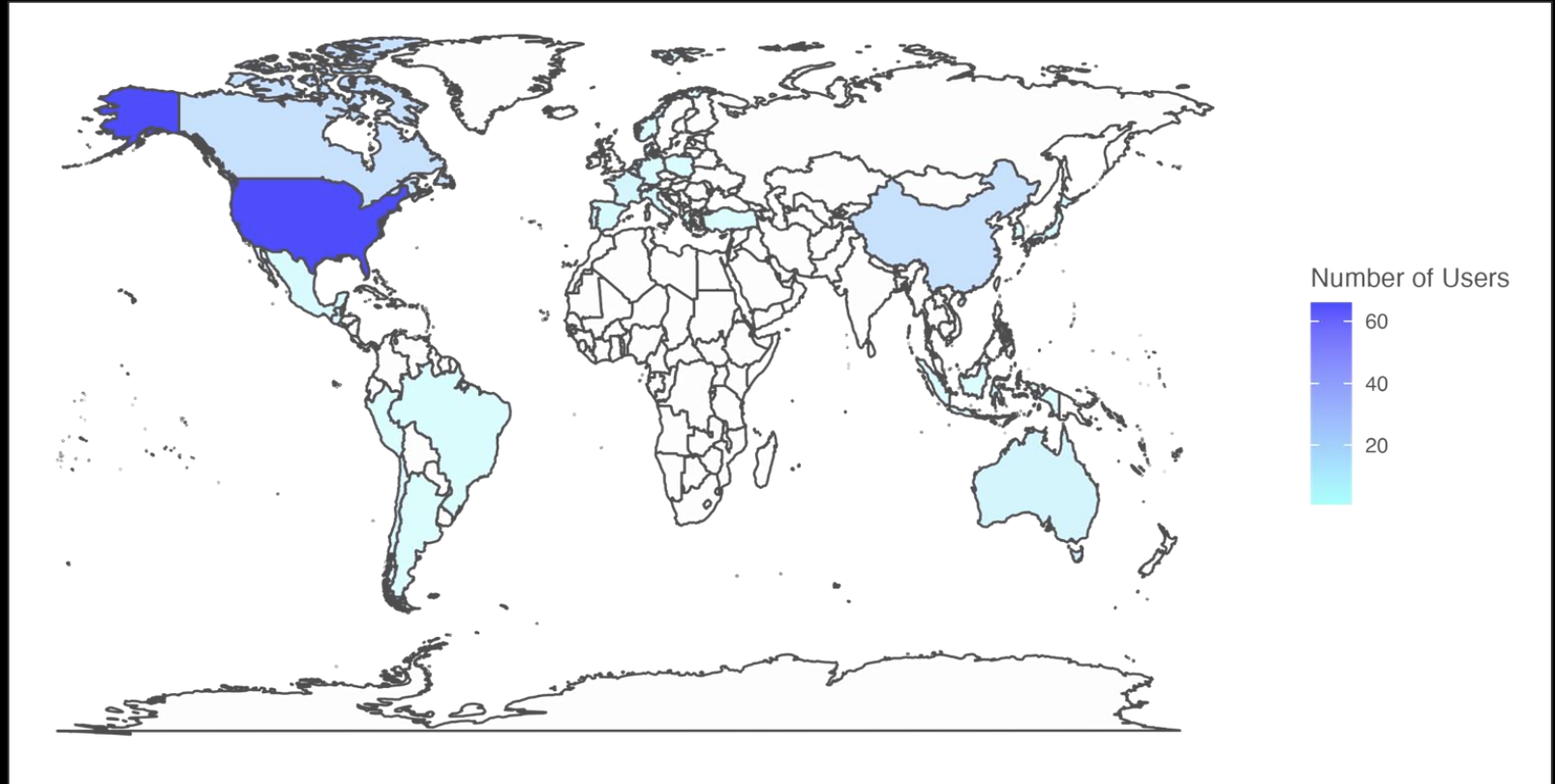
Lipid content
Protein content
Energy density





Database users by country

200 users across 30 countries



Trait applications

15 published studies across 9 regions

Oceanologia, 67 (1)/2025, 67111
Polish Academy of Sciences
Institute of Oceanology
Open access article under the CC BY license
<https://doi.org/10.5697/USFE4011>

Climate change and its effects on the marine food web with a concentration on the pelagic fishery in the northern Arabian Sea

Imtiaz Kashani*, Sher Khan Panhwar, Kishwar Kumar Kachhi

Journal of
Biogeography



RESEARCH ARTICLE | Open Access |

Composition and Functional Diversity of Juvenile Groundfish Assemblages in the California Current

Ryan Gasbarro , Jarrod A. Santora, Megan Cimino, Adena Schonfeld, Steven J. Bograd, Elliott L. Hazen, Brian K. Wells, John C. Field



Marine Pollution Bulletin

Volume 217, August 2025, 118029



Review

A critical review on ocean acidification driven by disinfection by-products discharge from ships' ballast water management systems: Impacts on carbon chemistry ☆

[Home](#) > [Coral Reefs](#) > [Article](#)

Inside the mesophotic zone: taxonomic and trait diversity of epifauna associated with black coral forests across an oceanic archipelago

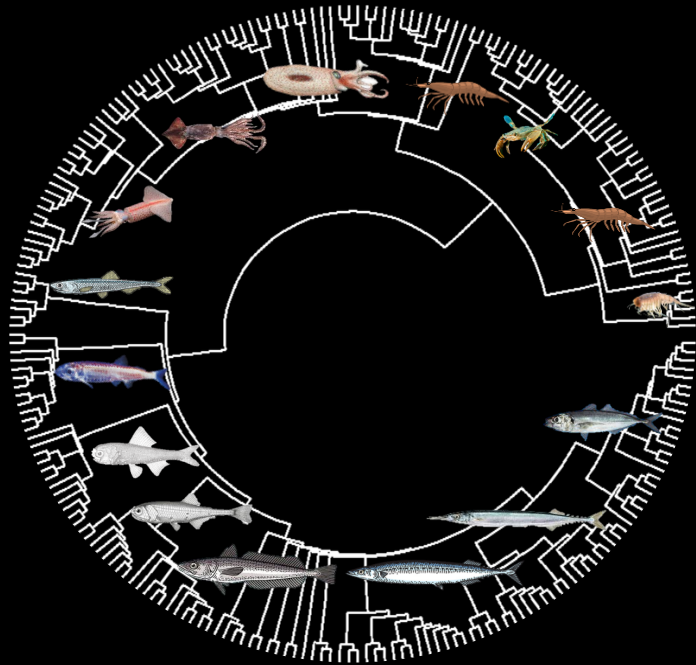
Research | Published: 08 September 2025

Volume 44, pages 1683–1701, (2025) [Cite this article](#)

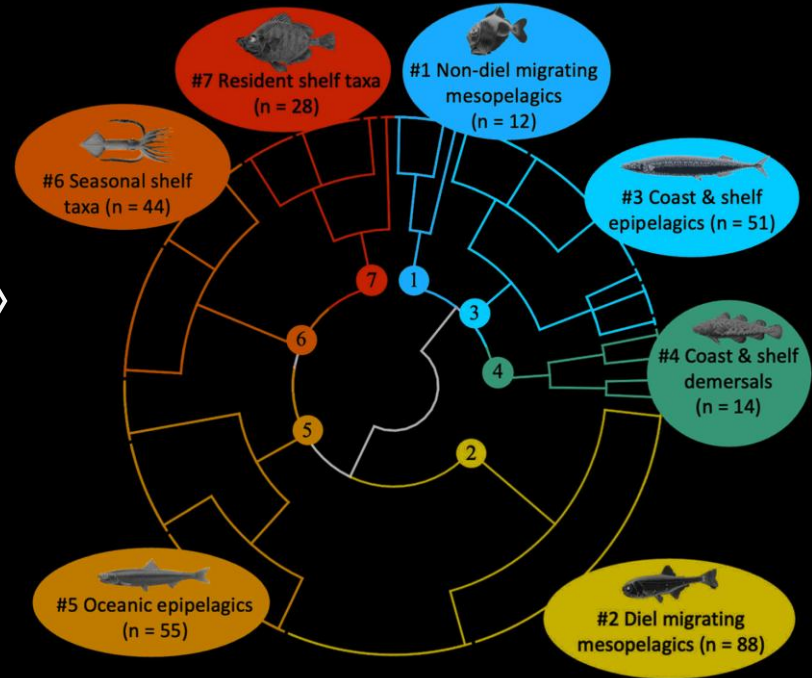
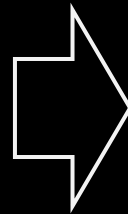


Trait applications

Simplify complex diets into trait guilds



>300 prey sp.



9 habitat guilds

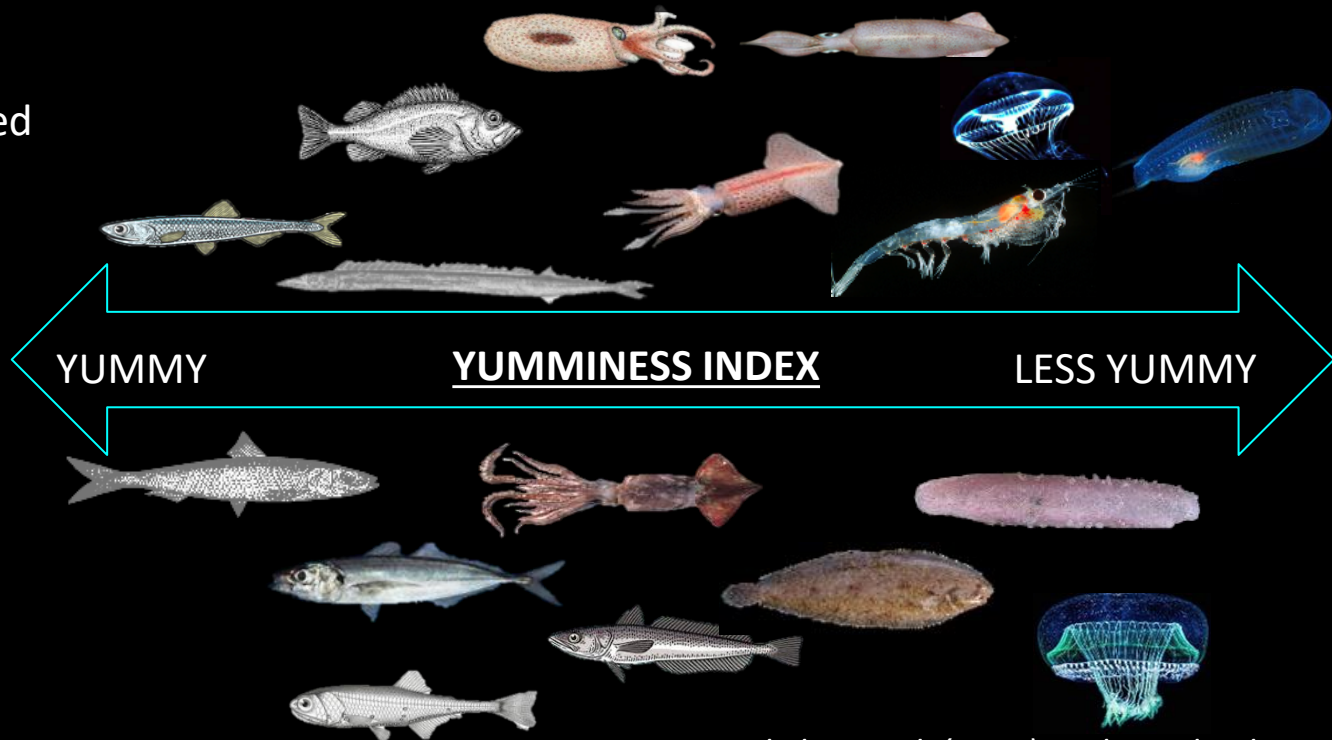


Trait applications

Quantify trait-based diet electivity

Score taxa on # of preferred traits:

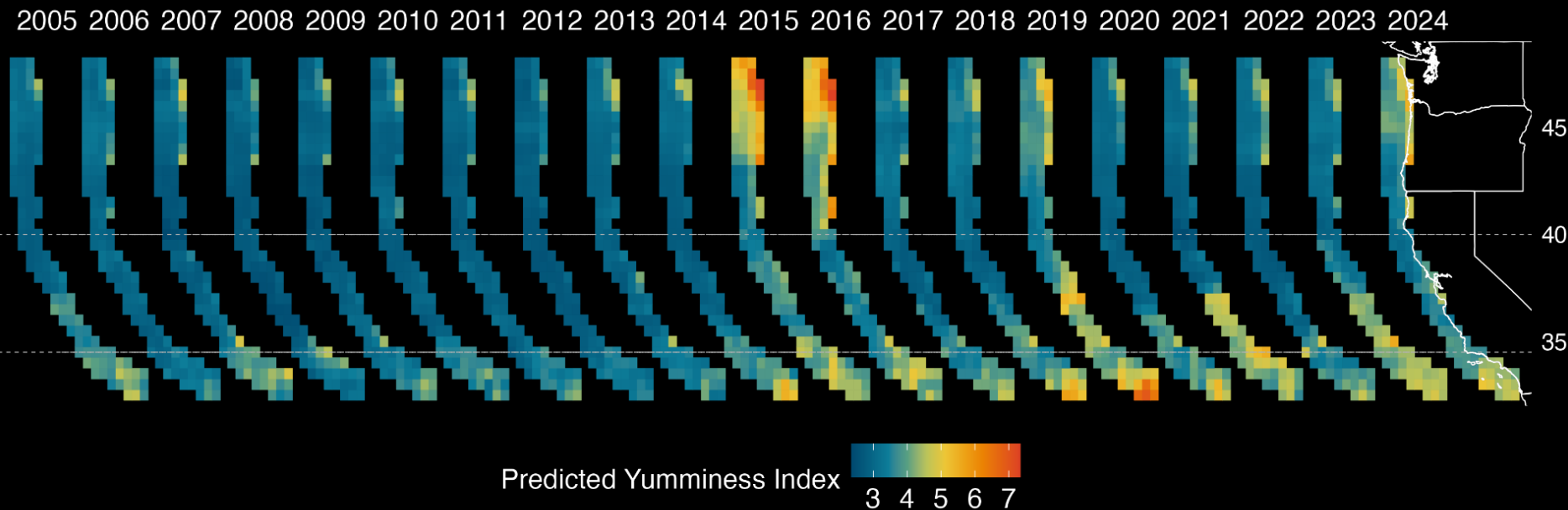
- Coastal
- Silvered
- Countershaded
- Undefended
- Non-transparent
- Shoaling/schooling
- Protein-rich
- Energy-rich
- Non-diel migrants





Trait applications

Predict quality and distribution of prey field

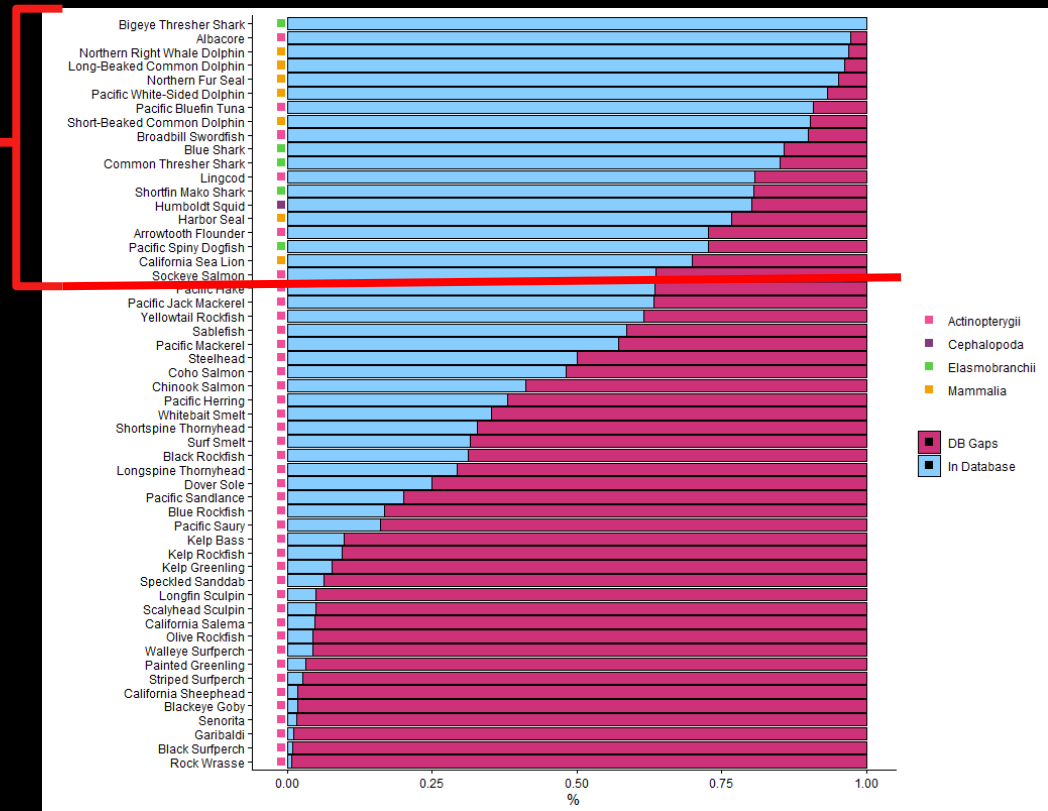


Trait applications

Extension to other predators

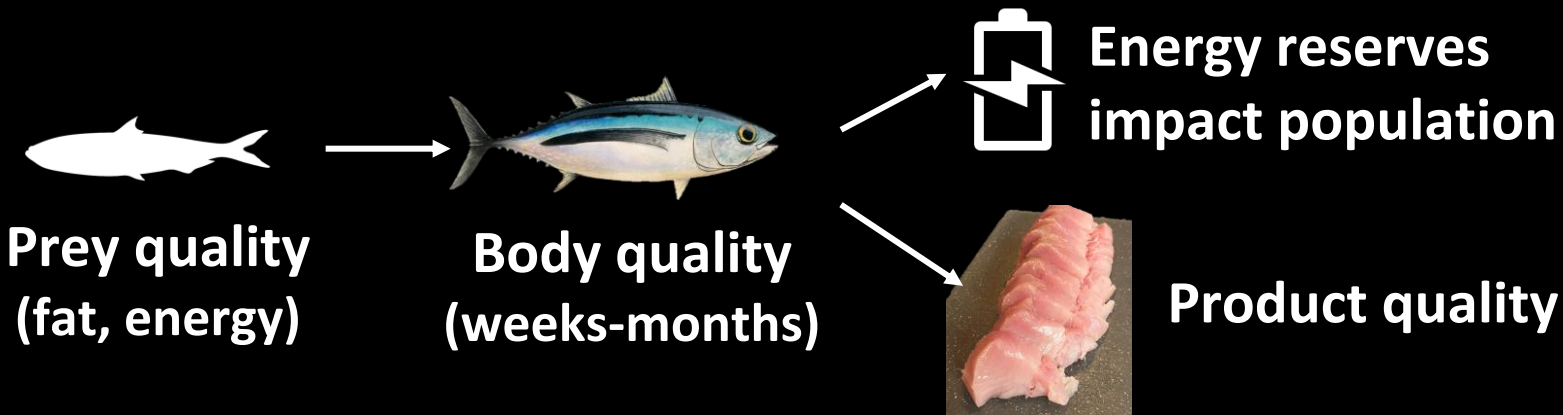


High overlap between diet composition and trait database



Trait applications

Link environment, diet, and predator condition



Miram
Gleiber

Cat
Nickels



Owyn
Snodgrass



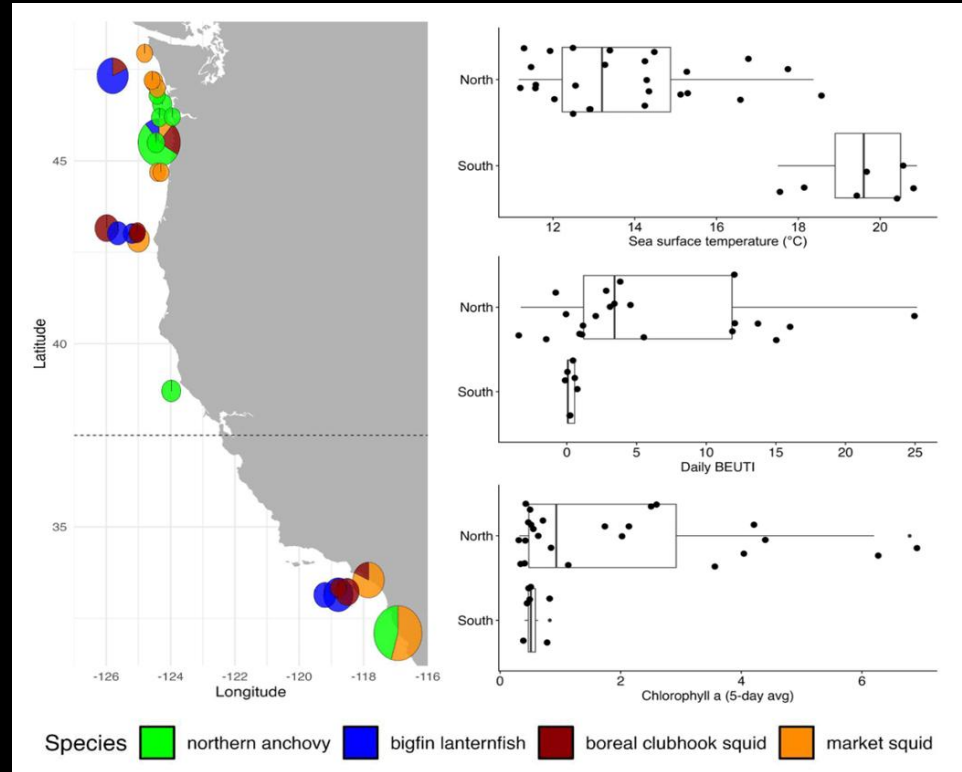
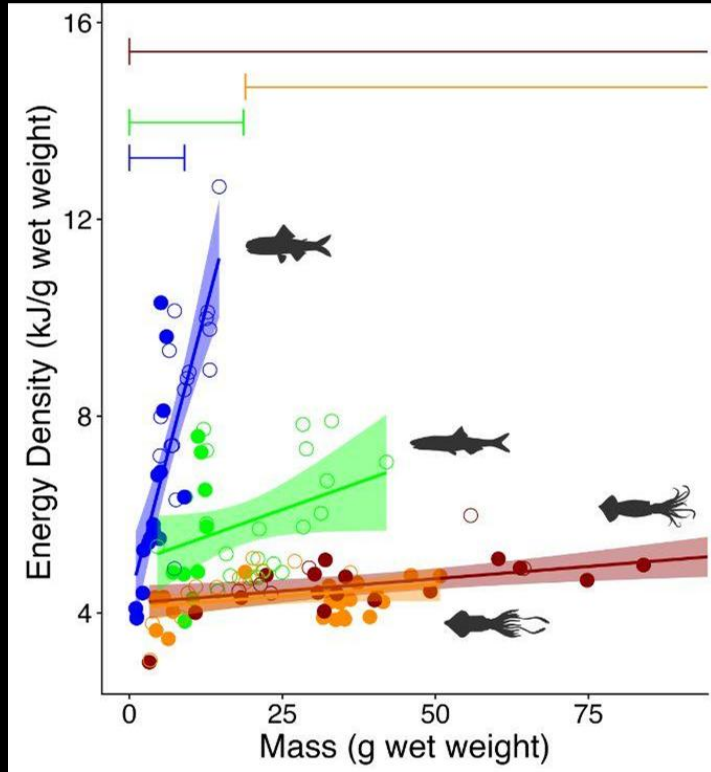
Travis
Richards



Barb
Muhling

Trait applications

Explore drivers of nutritional quality



Thank you

stephanie.green@ualberta.ca



Explore the
Pelagic Species Trait
Database and Research
Products



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PROGRAM



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