A decade of nearshore zooplankton dynamics and oceanographic variability in the Strait of Georgia

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PELAGIC ECOSYSTEMS LABORATORY

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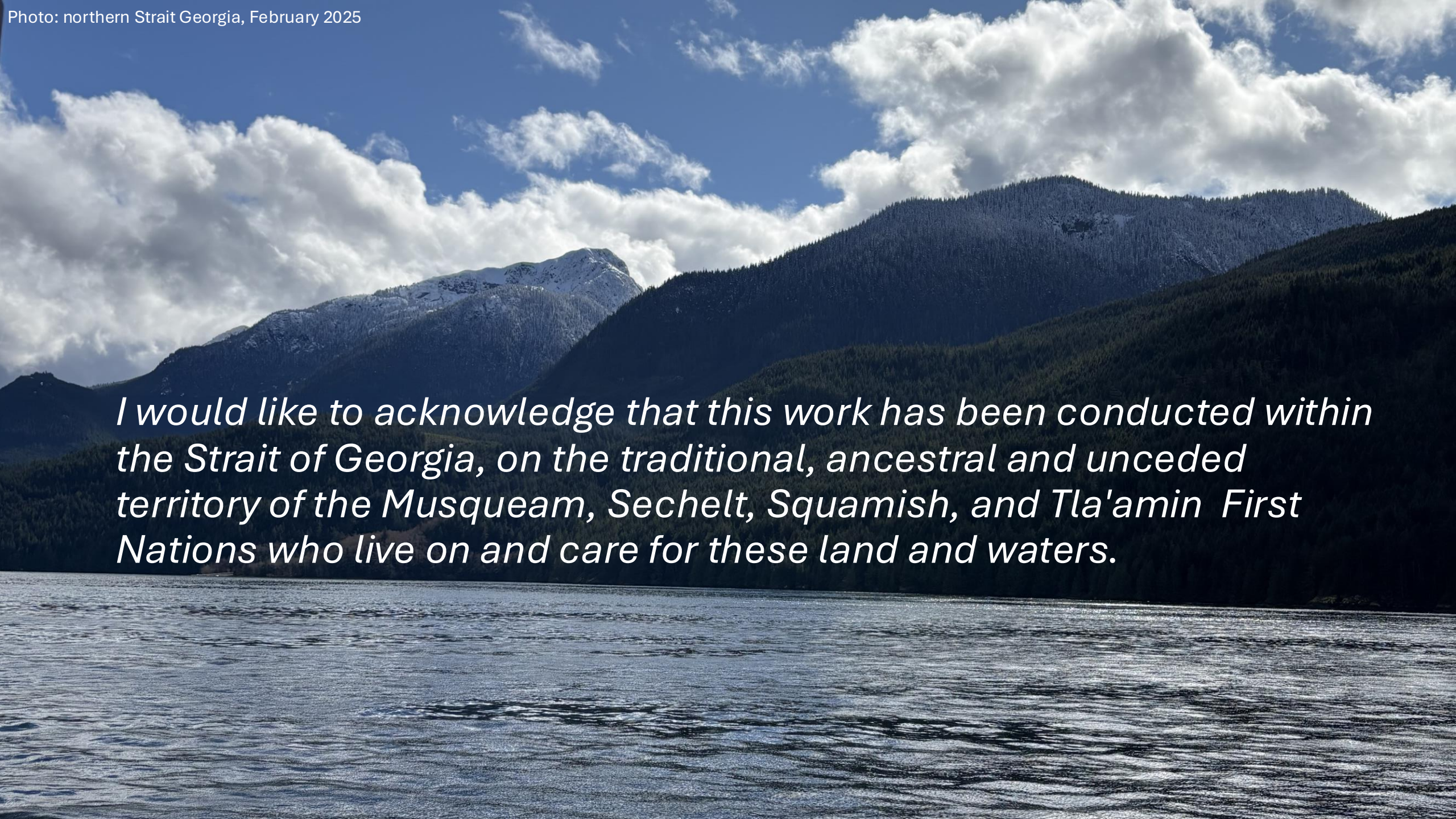
Photo: northern Strait Georgia, February 2025
I would like to acknowledge that this work has been conducted within the Strait of Georgia, on the traditional, ancestral and unceded territory of the Musqueam, Sechelt, Squamish, and Tla'amin First Nations who live on and care for these land and waters.

Nearshore Zooplankton Assemblages

Distinct and highly variable

Important habitat for many fish species, particularity forage fish such as juvenile salmon and herring

Experience closer proximity to terrestrial influences such as urbanization and industrialization.

Despite this nearshore zooplankton resources have received little attention in the Strait of Georgia.

Gaps in data availability

Image courtesy of Pacific Salmon Foundation

Most data are collected at coarse temporal resolution

Many samples that are collected are left unprocessed due to high resource costs

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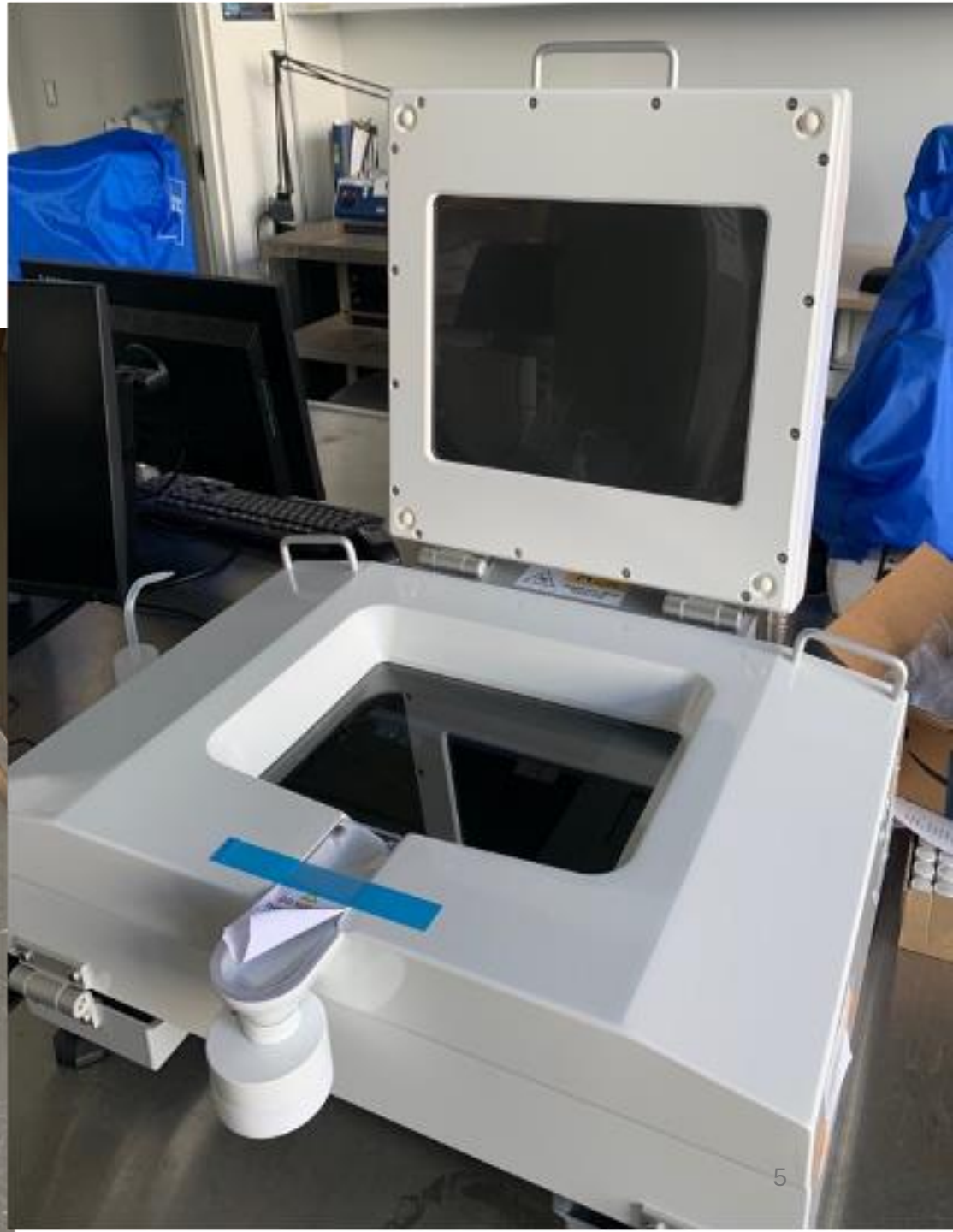
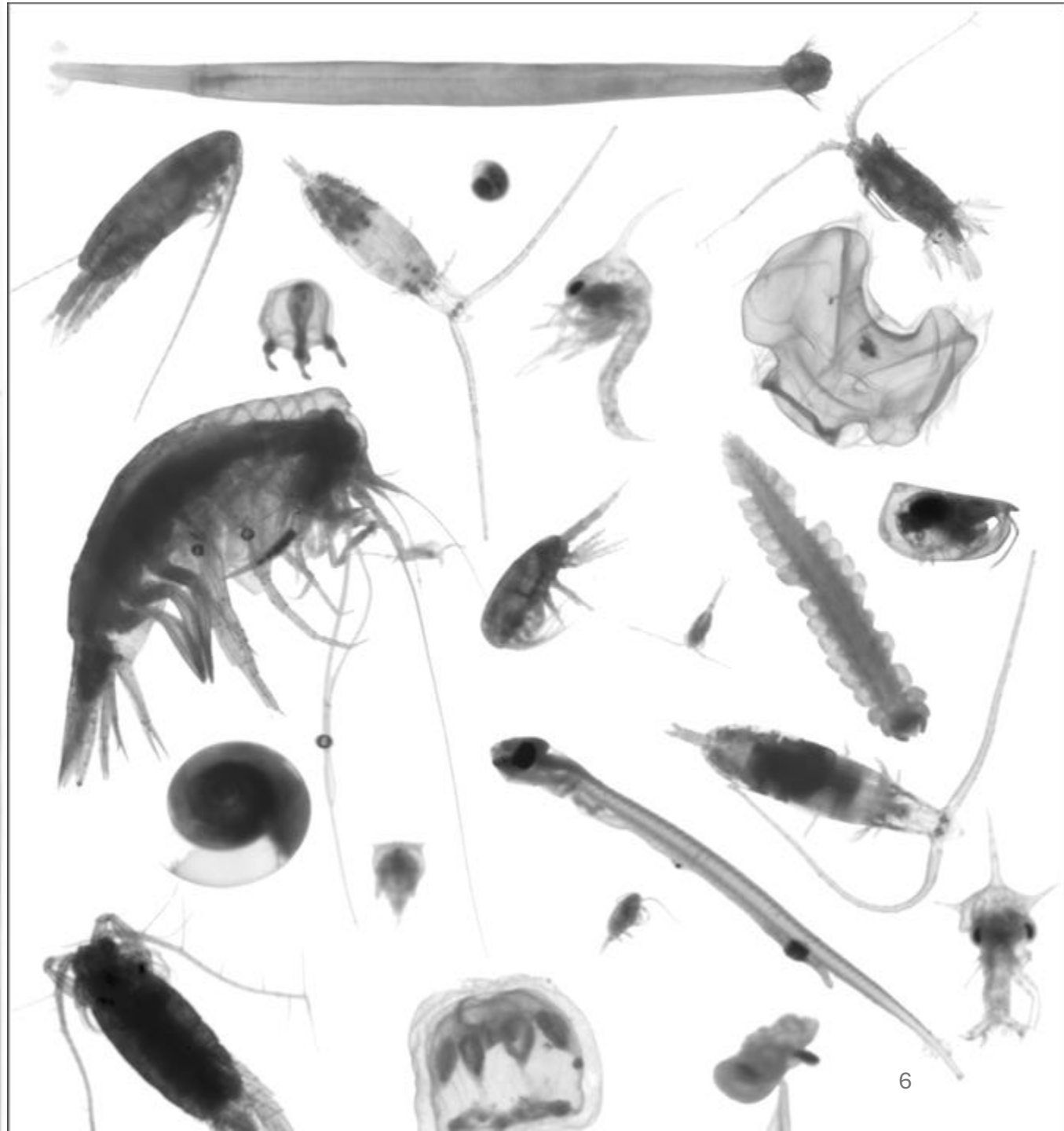




Taxa: Cyphocaris challengeri

Length: 1.36316 mm

Volume: 0.86908 mm^3

Citizen Science Project

Photos: PSF volunteers sampling Malaspina Strait, September 2024

Malaspina Strait

- Located in the Strait of Georgia
- Critical migration pathway for juvenile salmon
- Location of the “Malaspina Dragon”

ELSEVIER

Contents lists available at SciVerse ScienceDirect

Progress in Oceanography

journal homepage: www.elsevier.com/locate/pocean

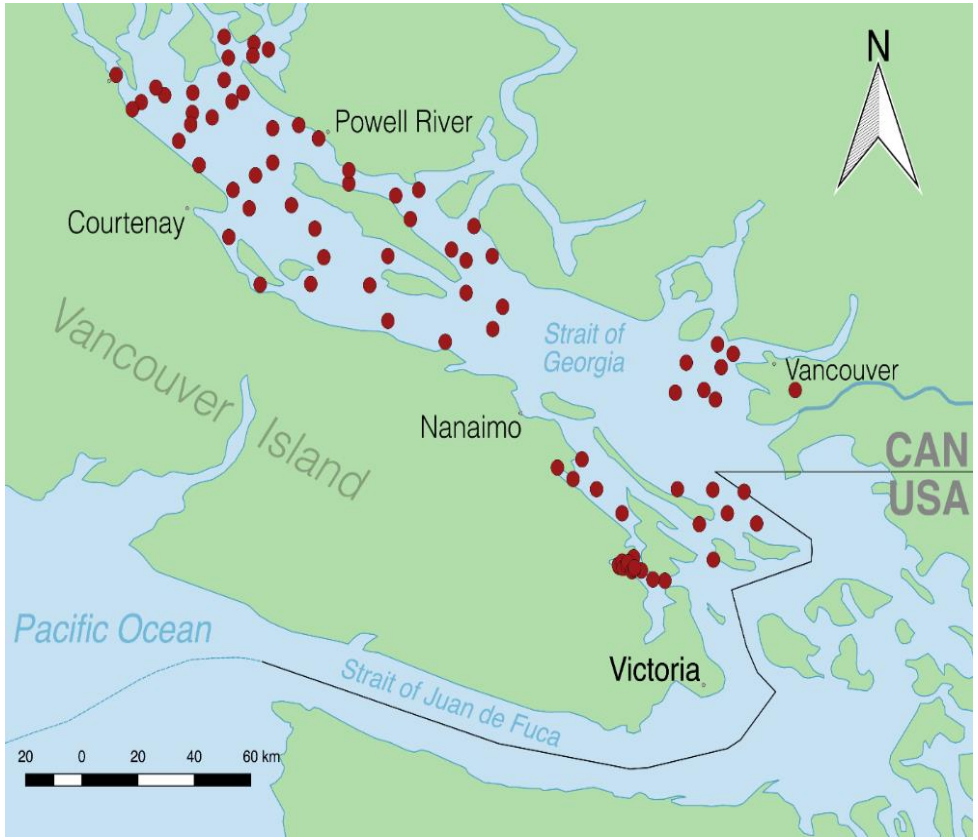
The Malaspina Dragon: A newly-discovered pattern of the early spring bloom in the Strait of Georgia, British Columbia, Canada

J. Gower [a,*], S. King [a], S. Statham [b], R. Fox [a], E. Young [b]

[a] Institute of Ocean Sciences, Sidney, BC, Canada
[b] Department of Geography, University of Victoria, Victoria, BC, Canada

Map of the Salish Sea & Surrounding Basin: Stefan Freelan, WWU, 2009

Pacific Salmon Foundation: Citizen Science Project (2015-2025)



Map courtesy of Pacific Salmon Foundation

- ~80 locations sampled 2-3 times per month between February to October
- “mosquito fleet” of citizen scientists that go out simultaneously
- Data on: http://www.oceannetworks.ca http://sogdatacentre.ca/

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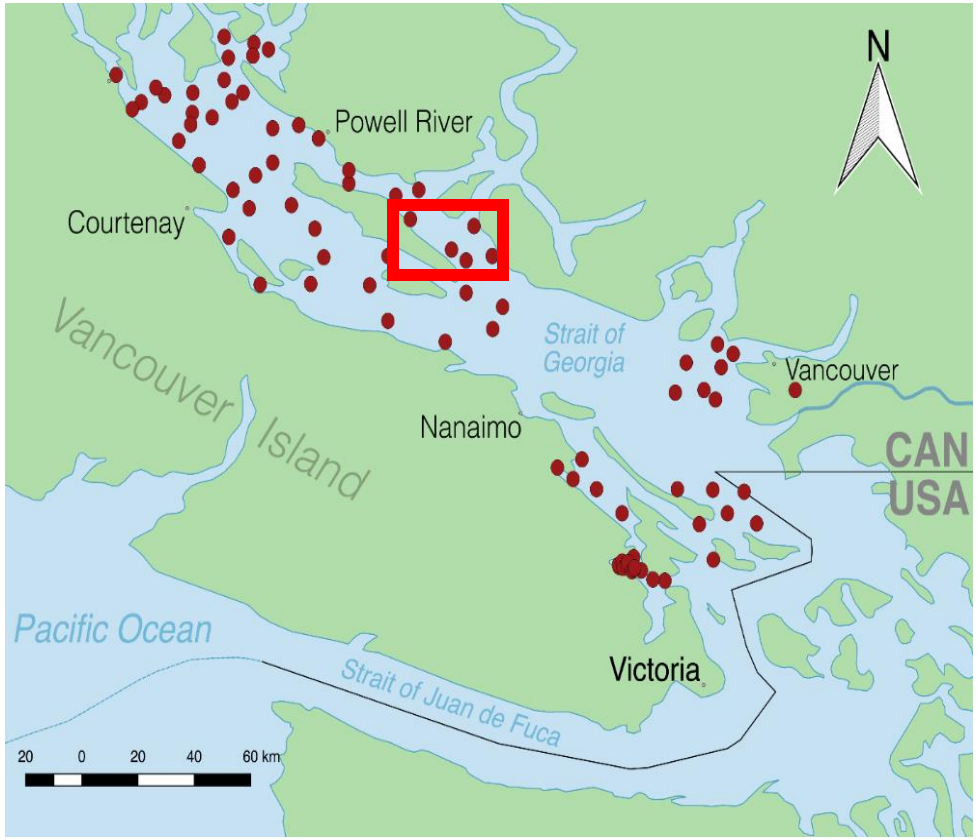
Pacific Salmon Foundation: Citizen Science Project (2015-2025)



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Zooplankton Sampling Sites

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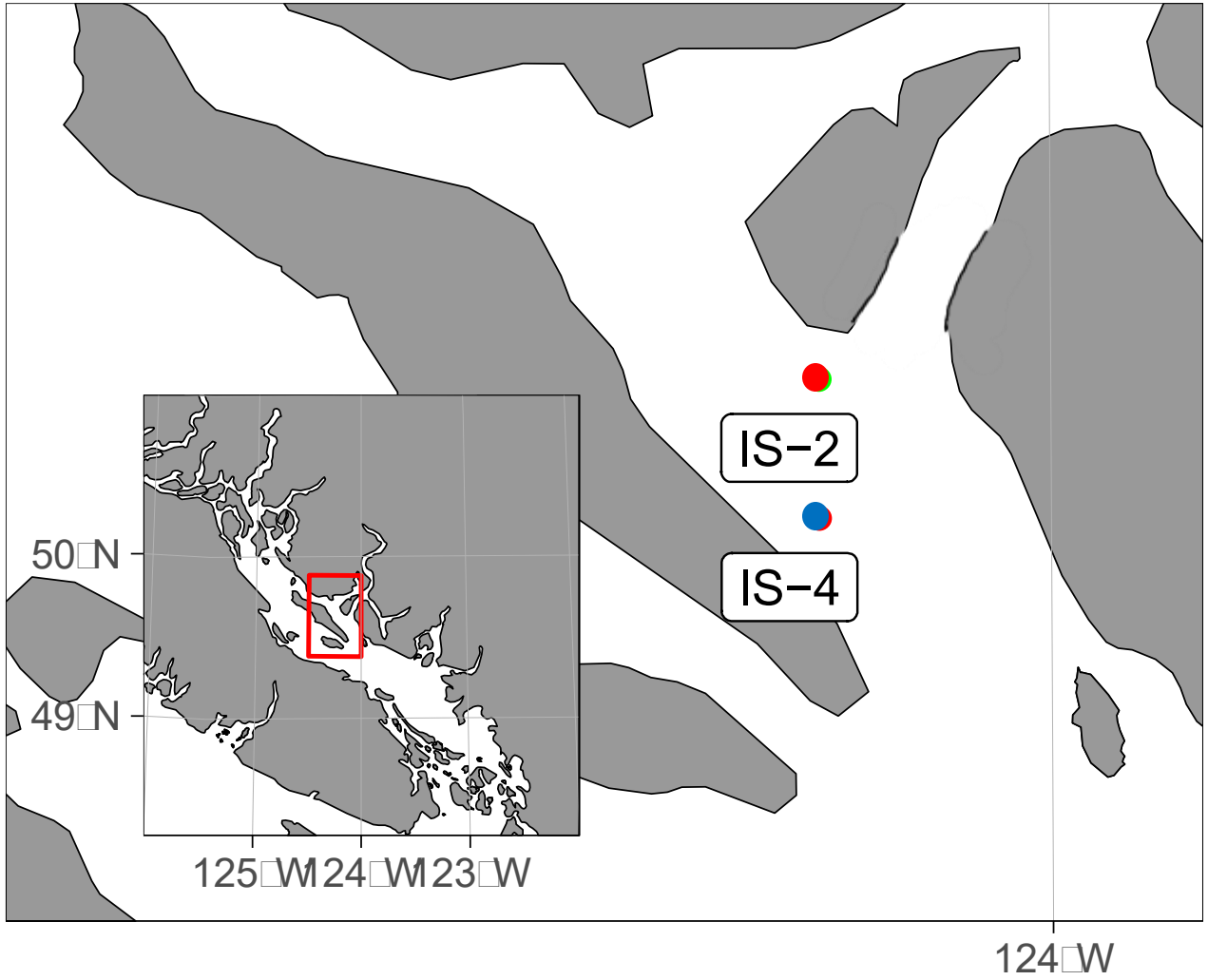


Sites:

- **IS-2 (depths ~30m, sampled to bottom)**
- **IS-4 (depths ~420 m, sampled to 150m)**

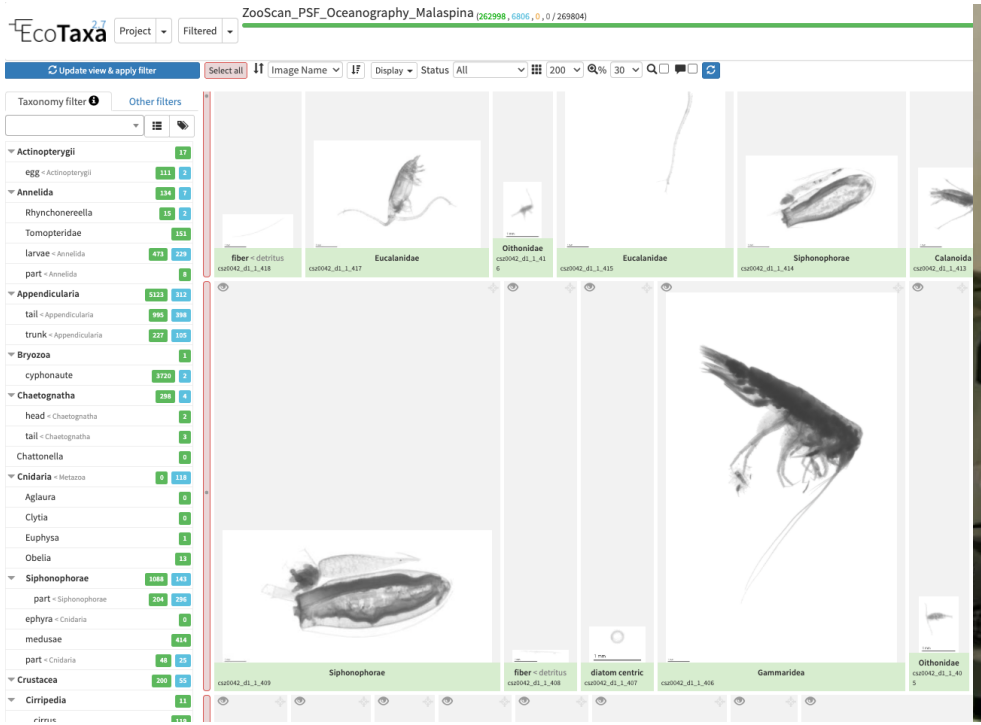
Variety of data captured

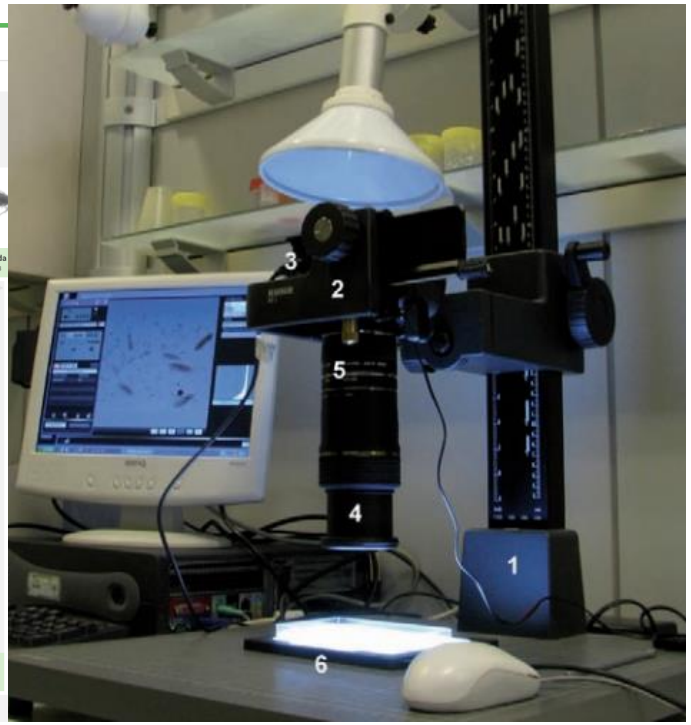
- CTD (temperature, salinity, chl)
- Nutrients (NO3, PO4, Si)
- **Zooplankton (vertical tow, ring net)**

Objective 1: develop protocols for semi-automated image processing technology in BC

Development of an open access image library

Public training workshop





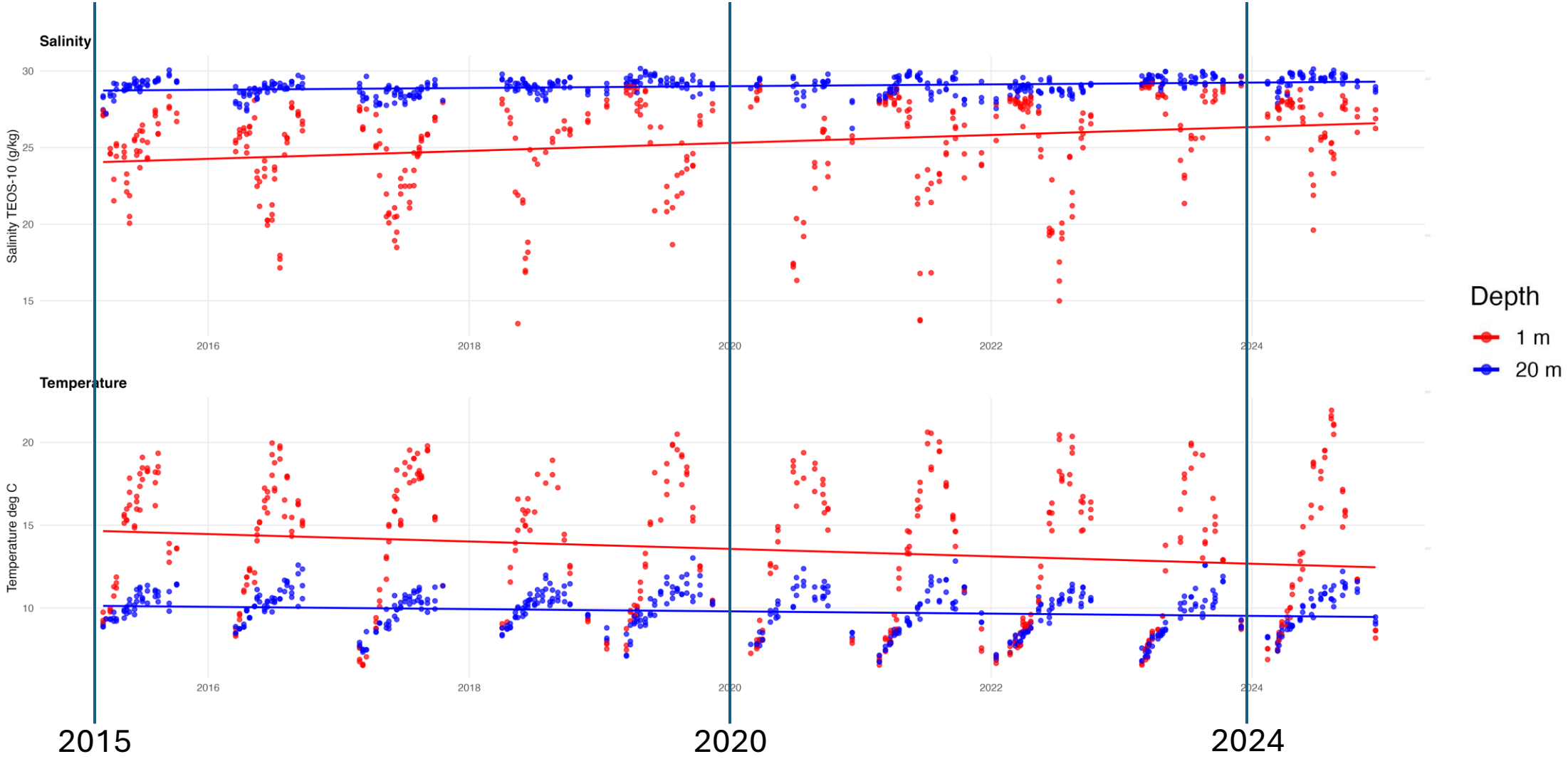
Bachiller, E., Fernandes, J.A., 2011. Zooplankton Image Analysis Manual: Automated identification by means of scanner and digital camera as imaging devices. 18(2): 16-37.

Objective 2: Use developed protocols to assess nearshore zooplankton assemblage dynamics

1. Assess oceanographic variability
2. Assess variation in zooplankton total biovolume, abundance and species composition

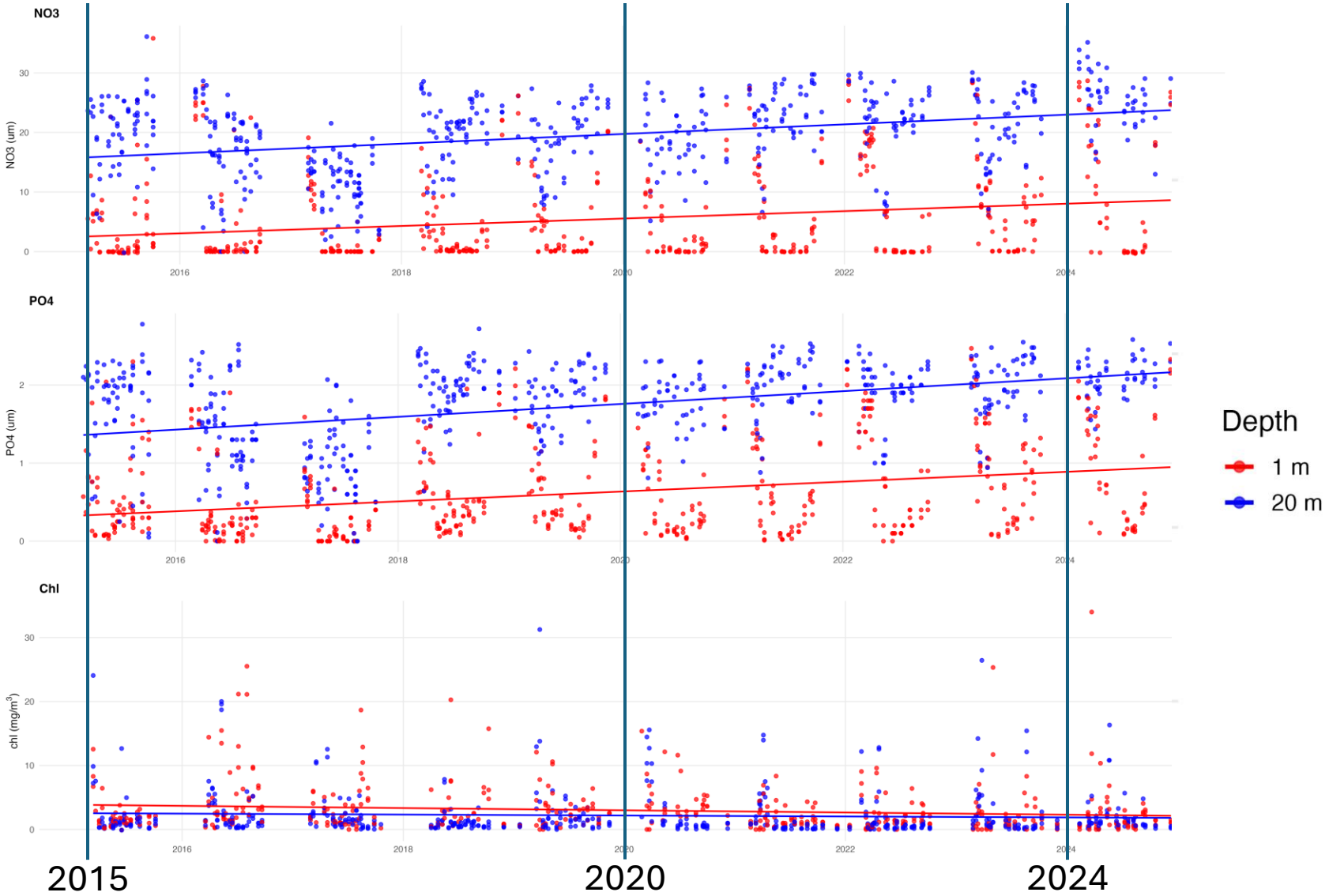
CTD data by Dr. Rich Pawlowicz, UBC

Oceanographic variability in Malaspina Strait



Nutrient data by Dr. Rich Pawlowicz, UBC

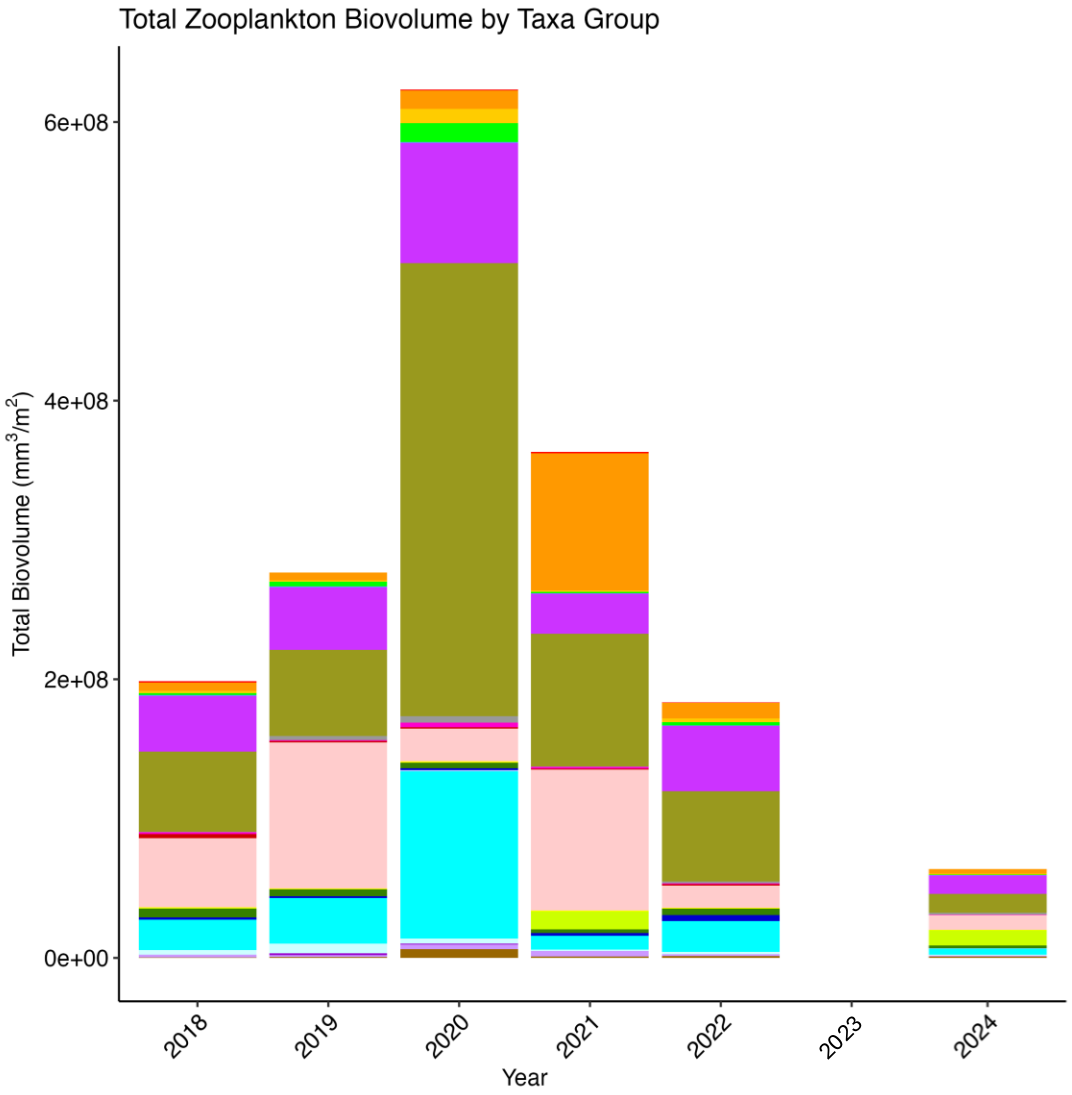
Nutrients and Chlorophyll

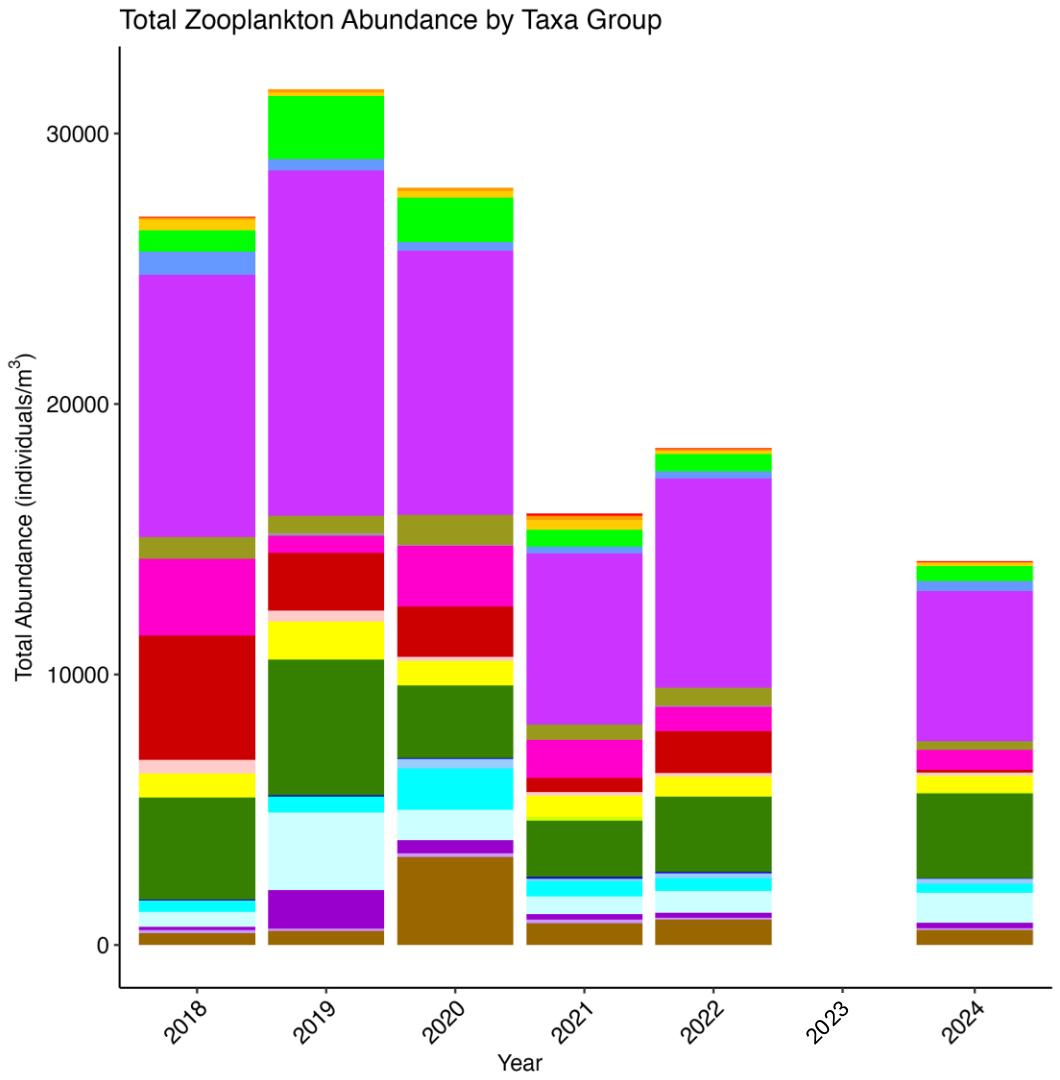


Nutrients (NO_3 and PO_4) show an increasing trend at surface and 20m

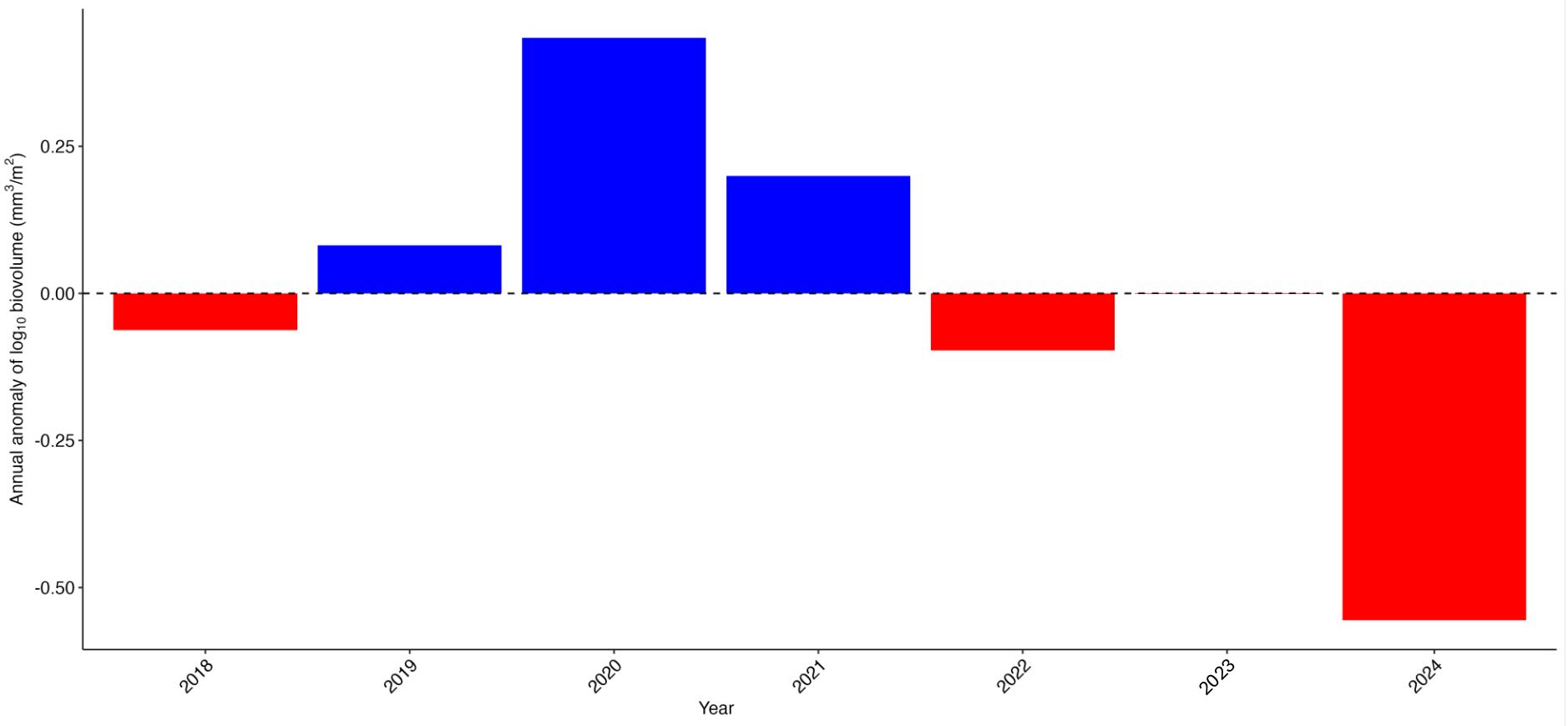
Chlorophyll does not increase over the same period

Zooplankton biovolume and abundance





Annual biovolume anomalies



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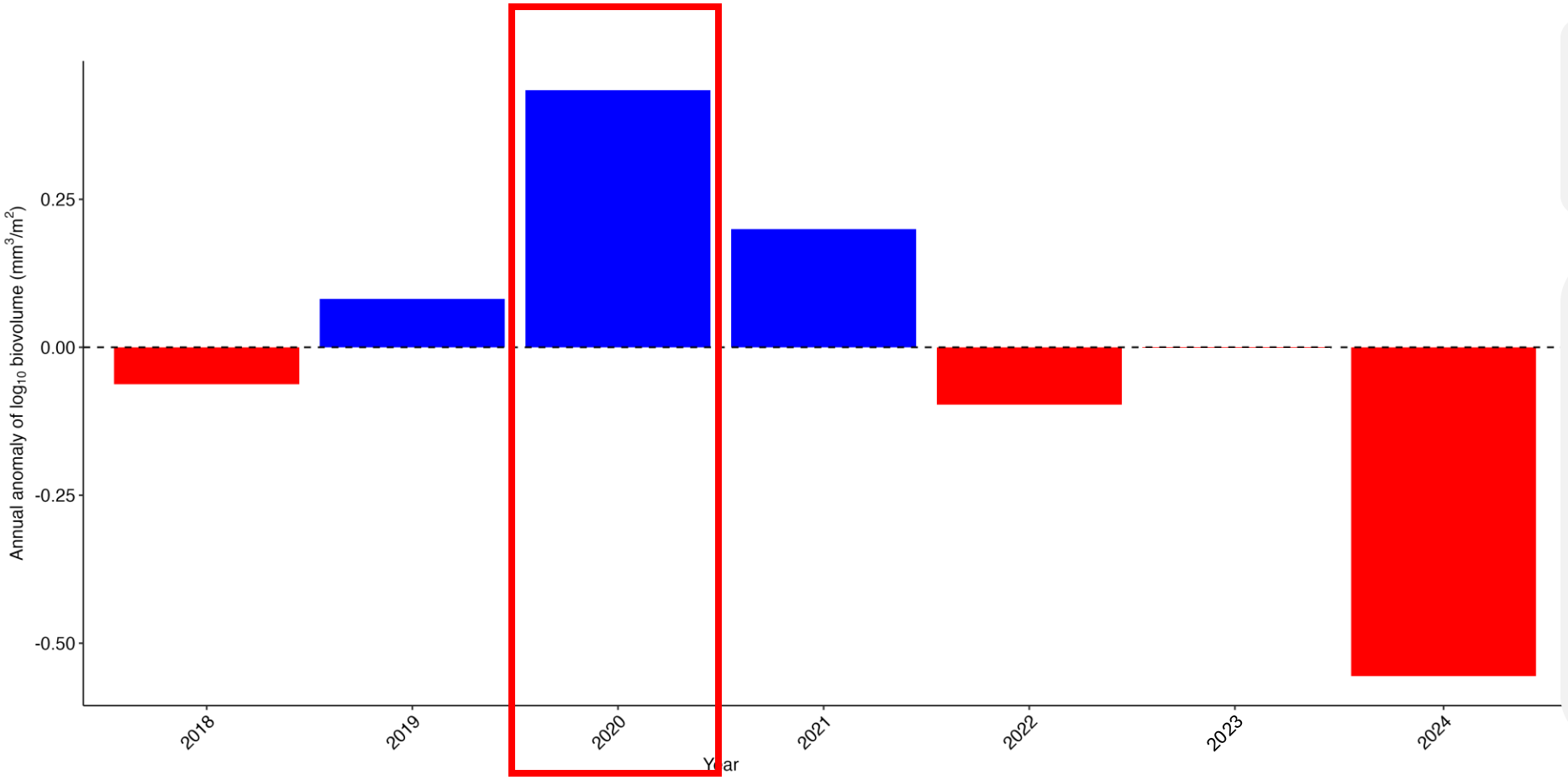
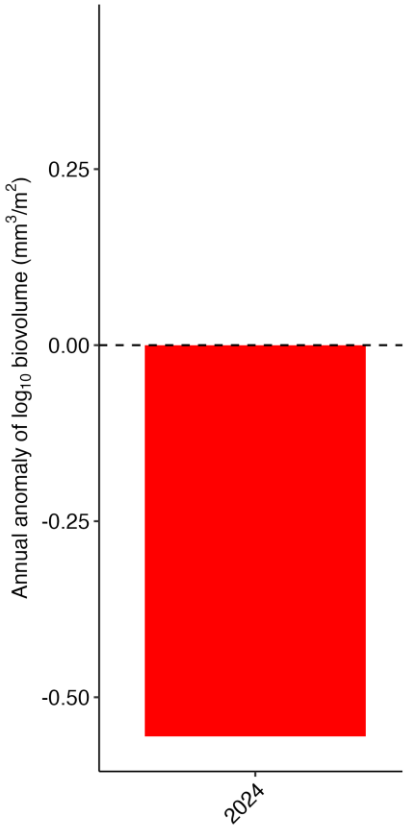


Highest positive anomaly in 2020

This is also reflected in higher-than-normal zooplankton biomass across the Strait of Georgia in 2020

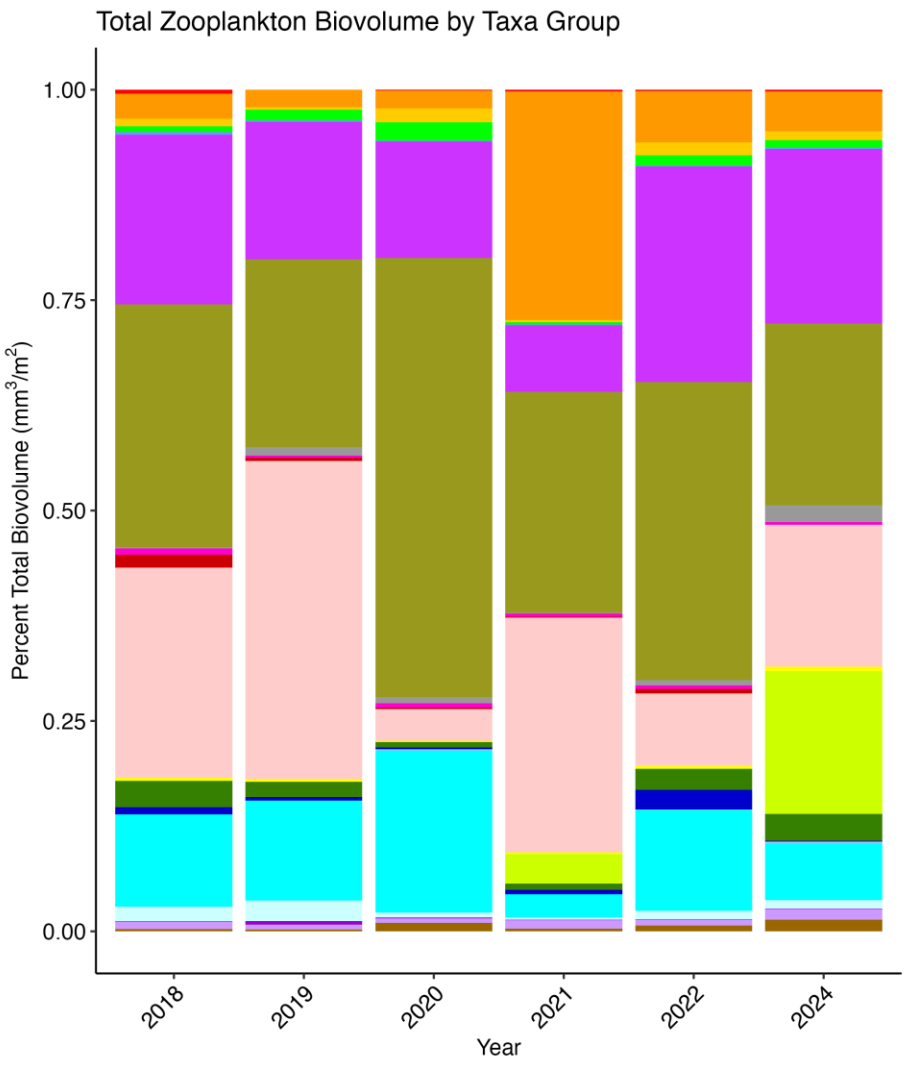
Annual biovolume anomalies

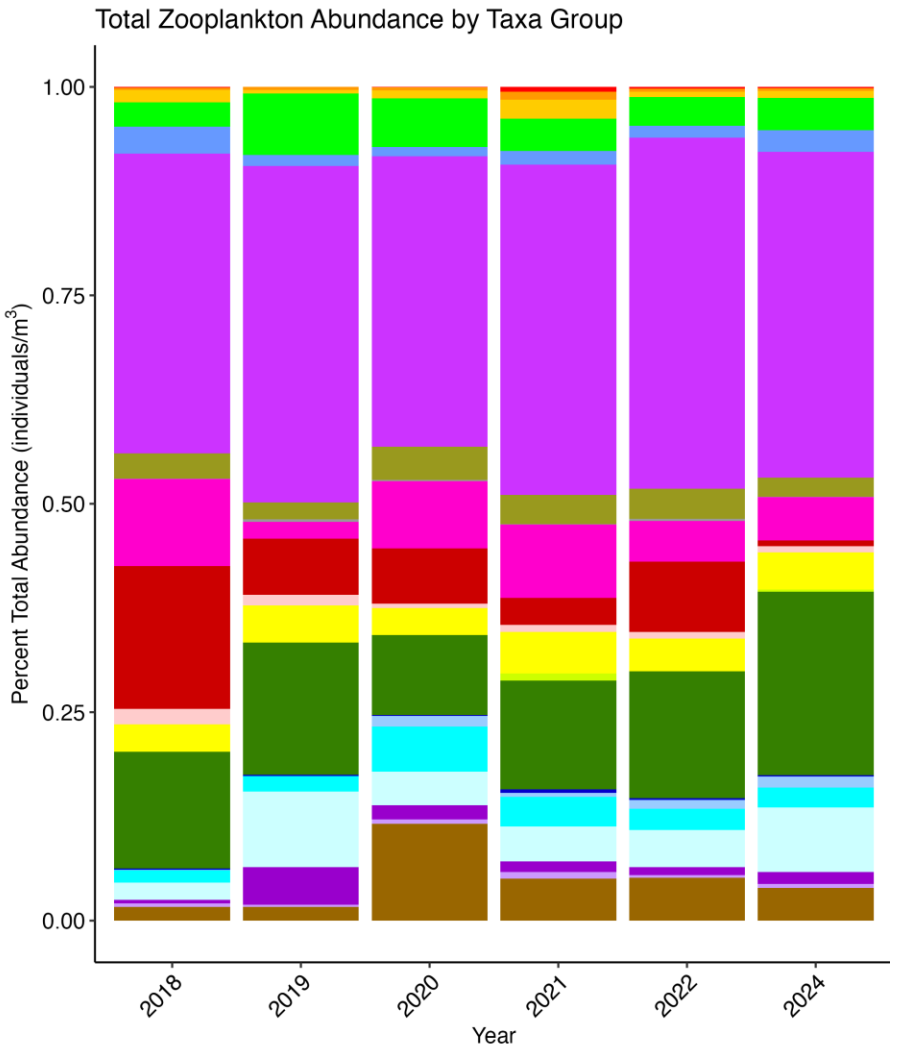


2024 is an anomalously low year for zooplankton biovolume in Malaspina Strait

This was not observed elsewhere in the Strait of Georgia

Species composition





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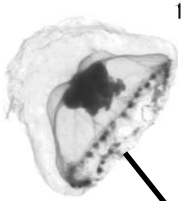

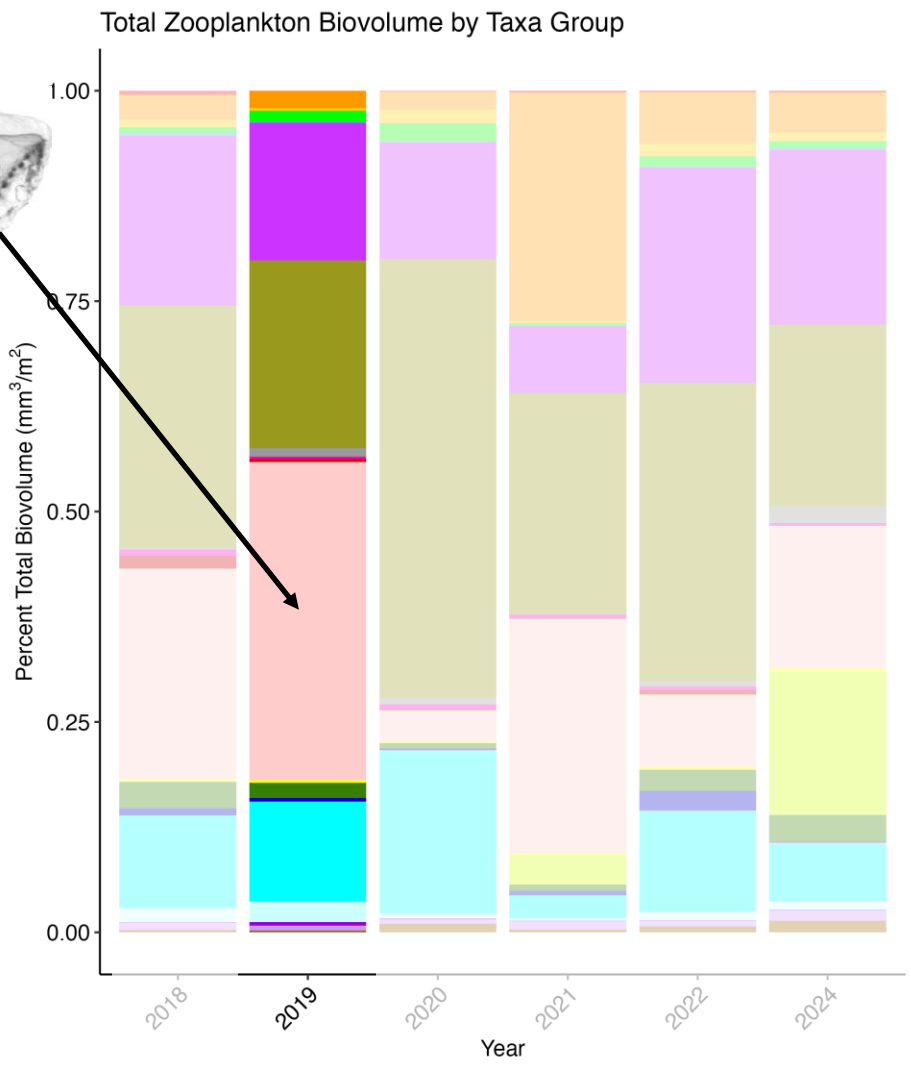

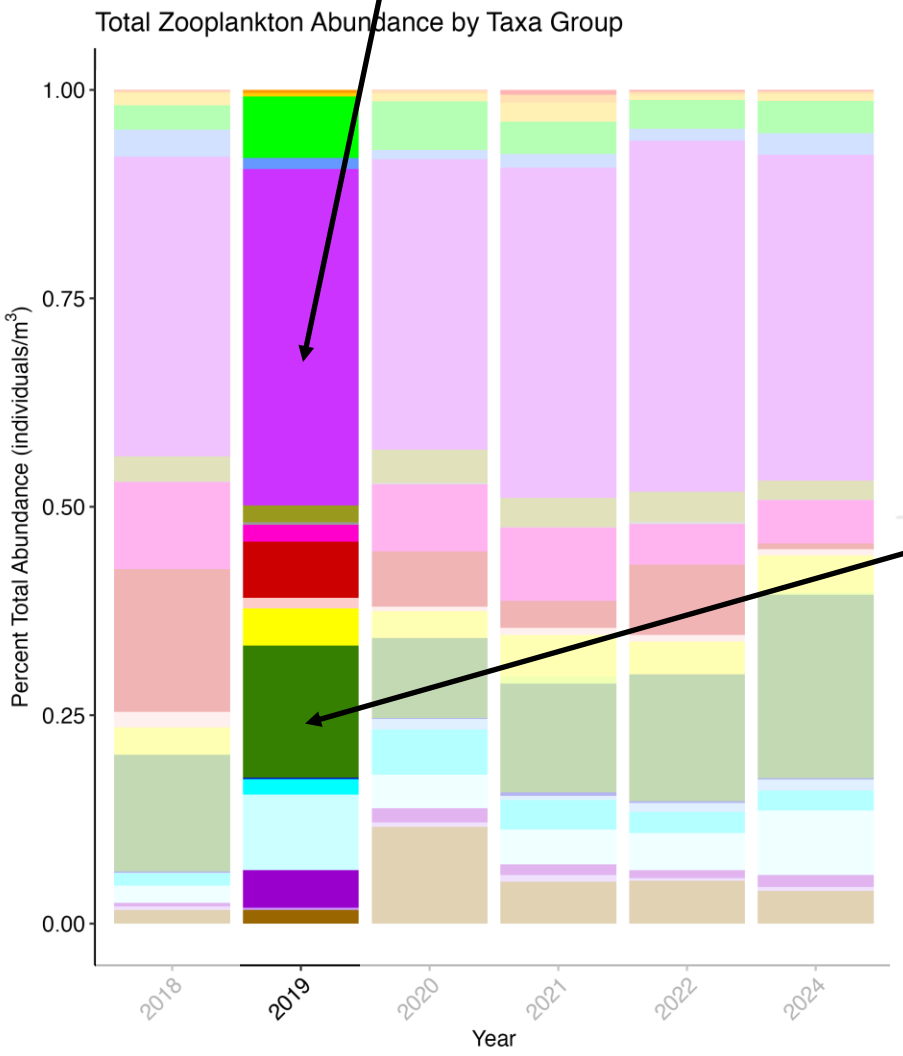

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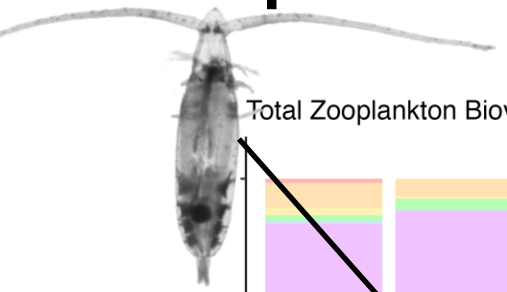

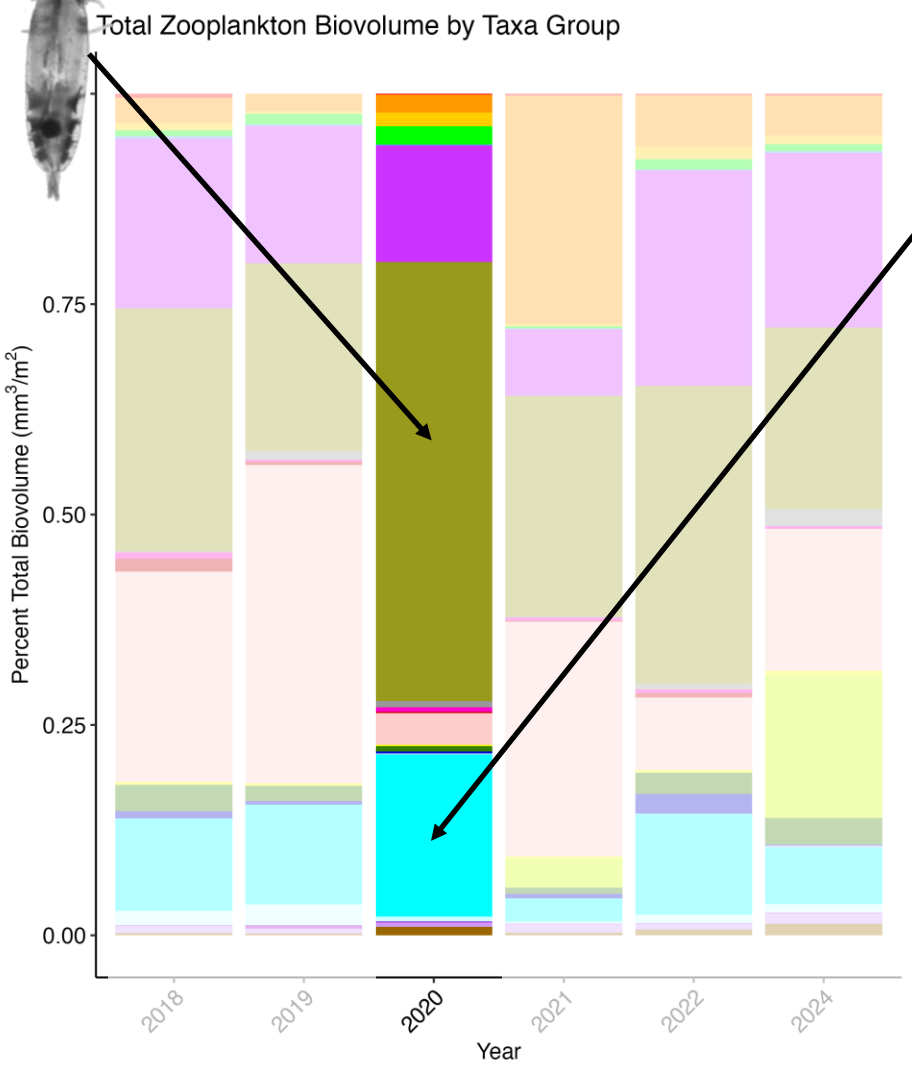

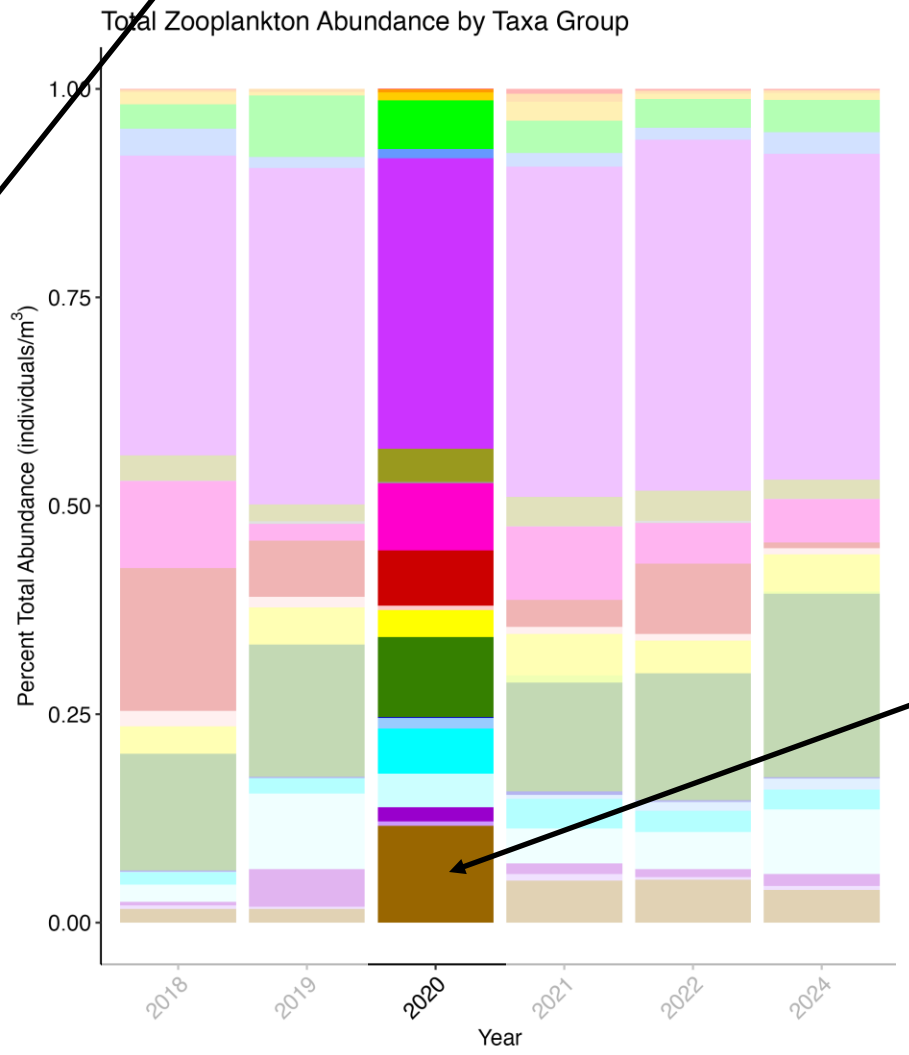

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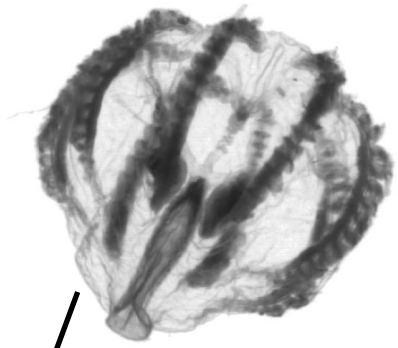

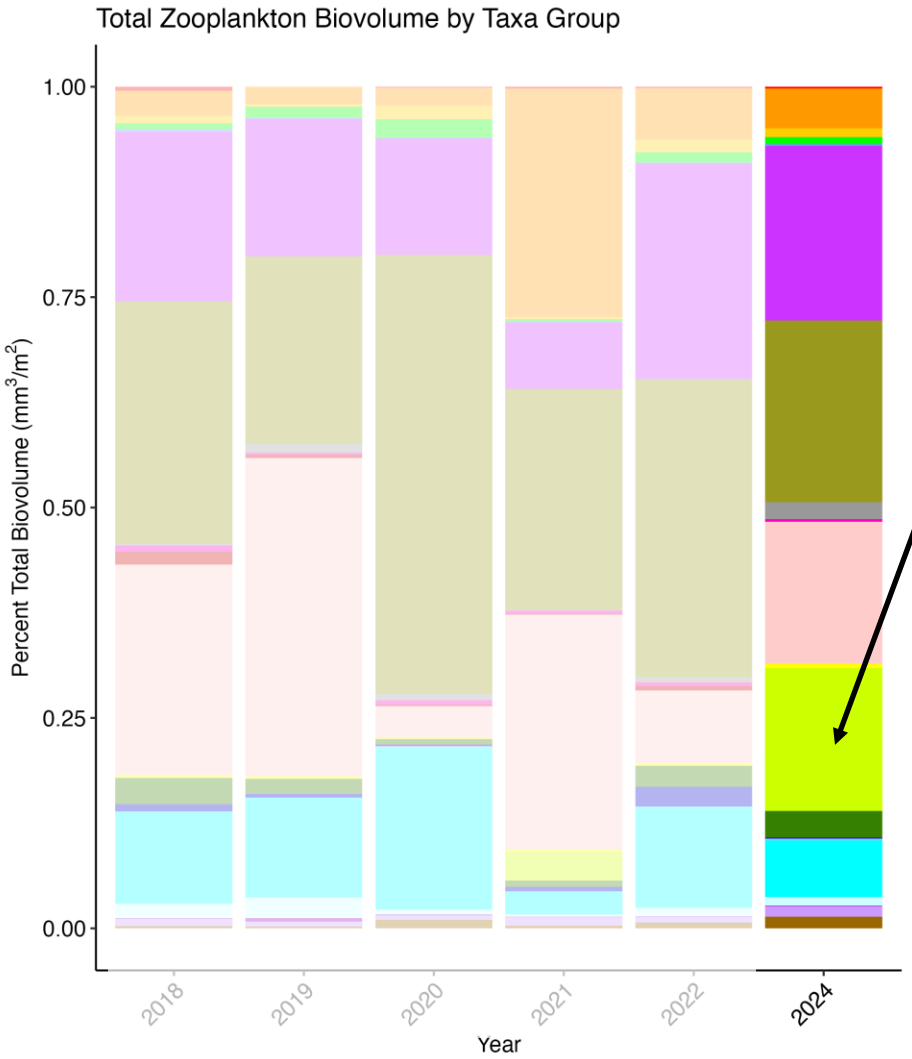

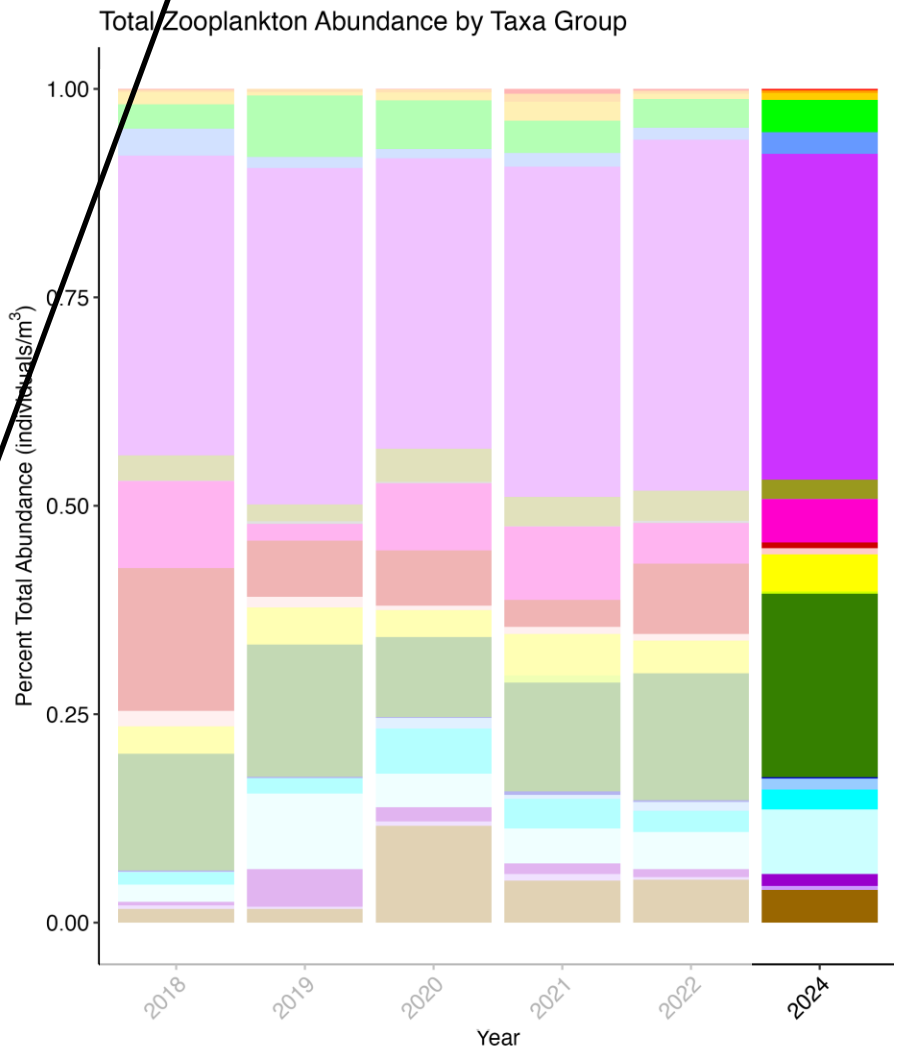

Conclusions

There is distinct interannual variability that deviates from what has been observed in the greater Strait of Georgia

Since 2021, both abundance and biovolume in Malaspina Strait have decreased, reaching an anomalously low level in 2024

Taxonomic composition varies strongly between years

Future work

Expand temporal range to include 2015-2017, 2025

- ➢Use these data to compare microscopy and image analysis methodologies

Examine the effect of toxic algal blooms on biovolume anomalies and species composition in Malaspina Strait

Assess the impact of bottom depth on species composition

Thank you!

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