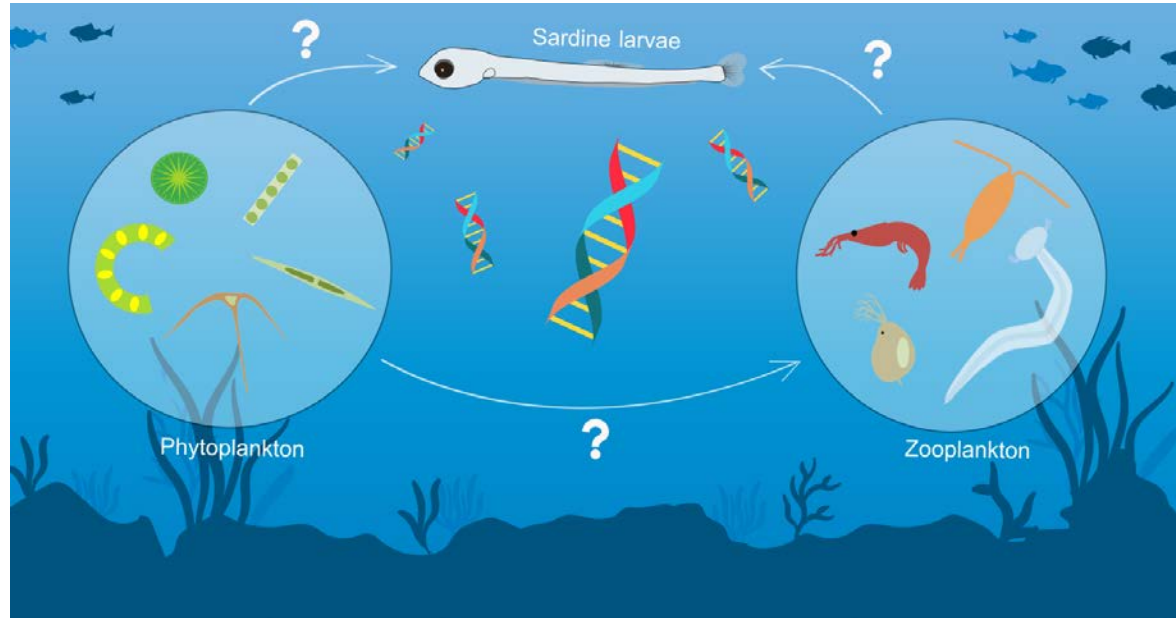# Potential impact of zooplankton community composition changes on the fitness of *Sardina pilchardus* in the SW Mediterranean Sea
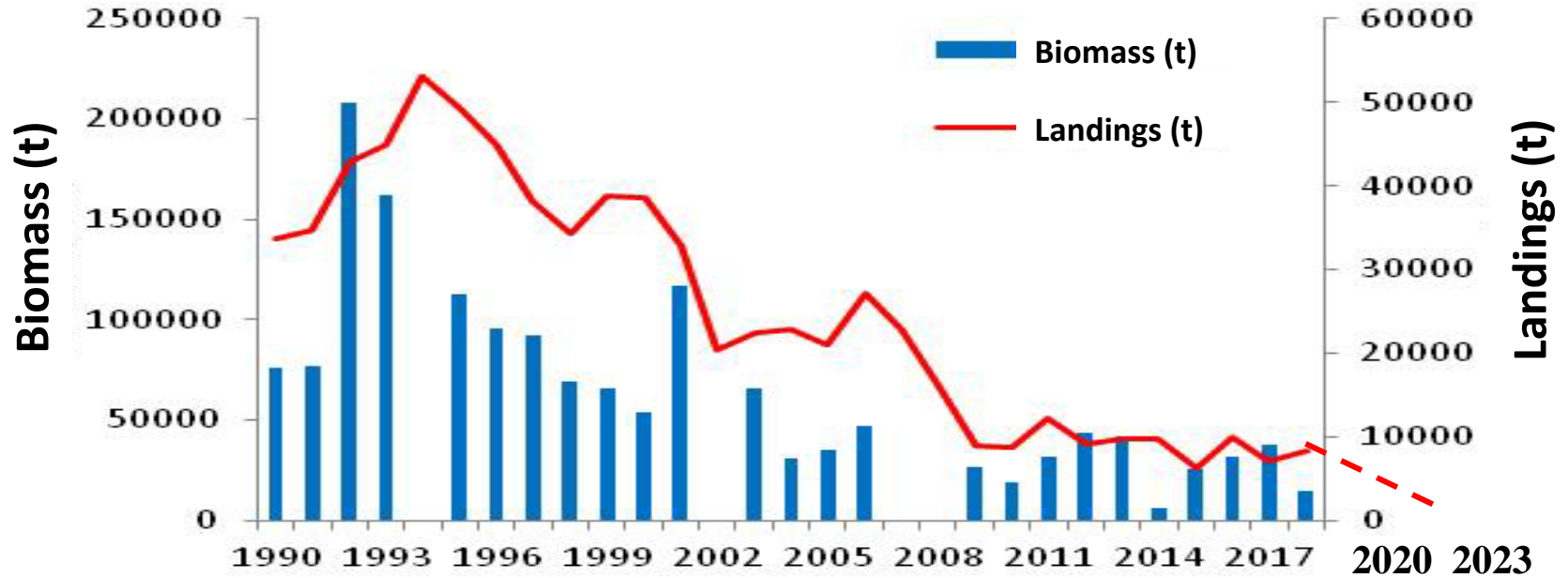

Lidia Yebra, Elena Pérez-Rubín, Nerea Valcárcel-Pérez, Jesús M. Mercado

Mediterranean Sea small pelagic fisheries decline: both in size and condition

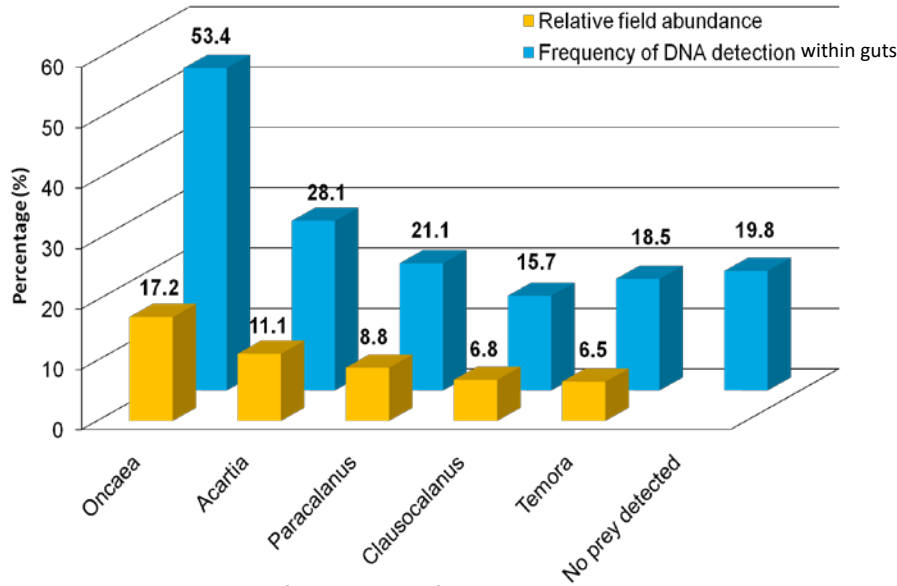*Sardina pilchardus, W Mediterranean. Torres et al. 2018*

★ Socio-economic consequences
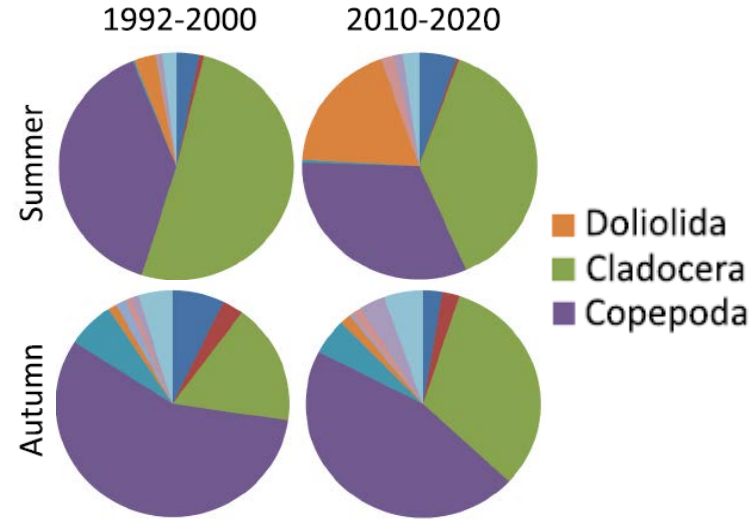
What causes this decline?

Fishing pressure & environmental changes

Opportunistic predators of copepods

Prey field has changed
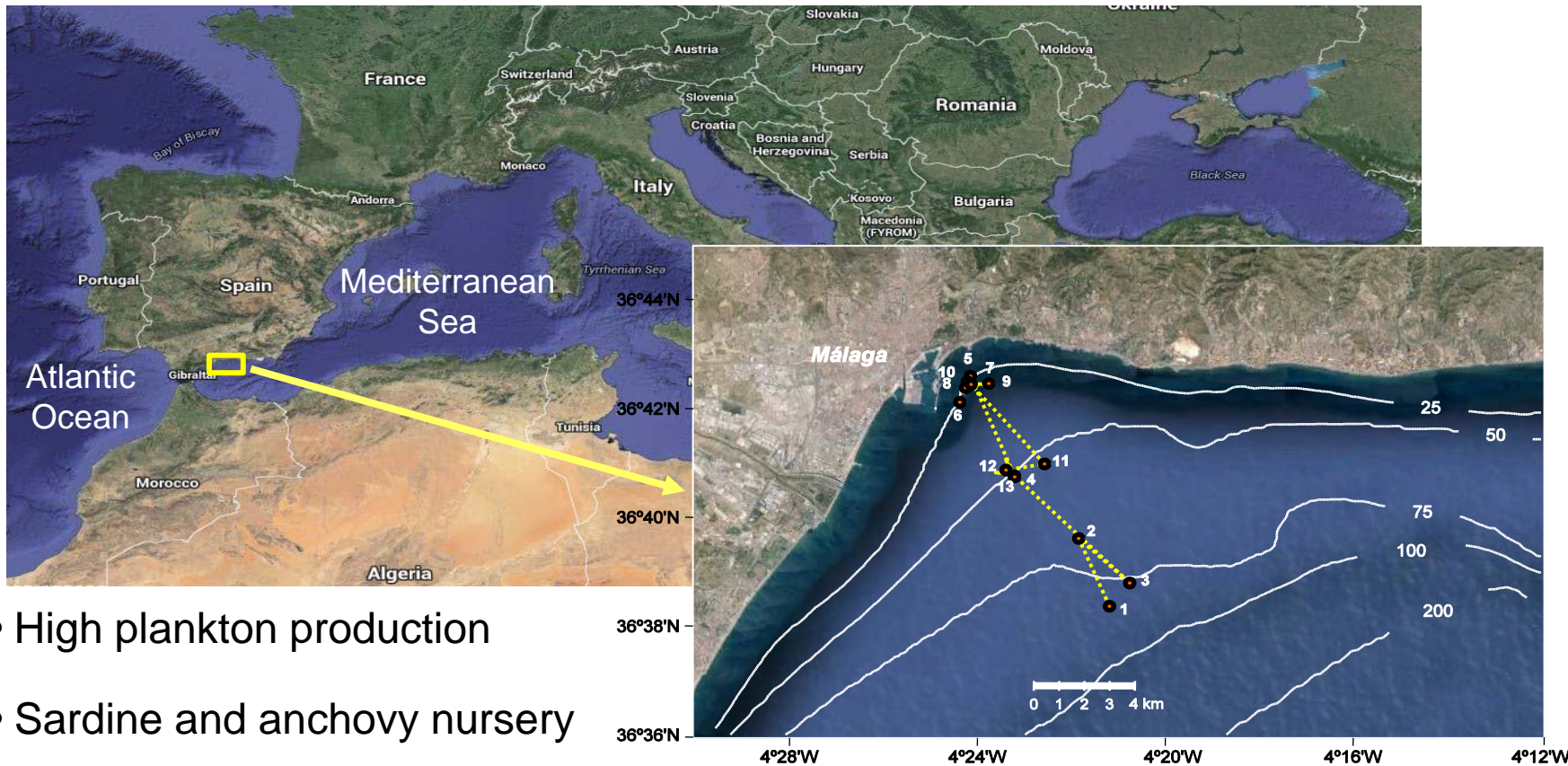

Yebra et al. 2019

Yebra et al. 2022

Do they prey on other organisms?

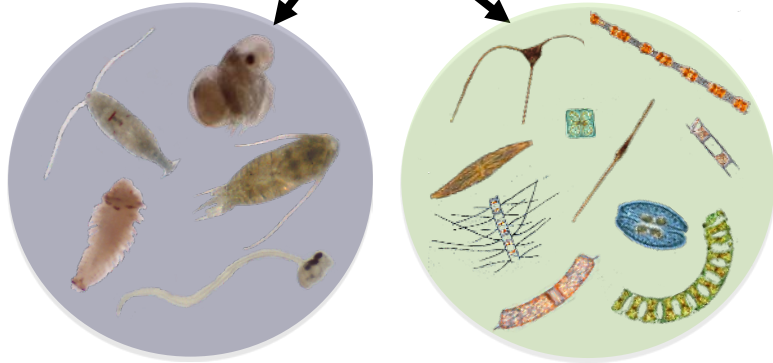# Study area: Málaga Bay

- High plankton production
- Sardine and anchovy nursery
- Autumn spawning season

Sampling stations location over time (26 hours cycle)

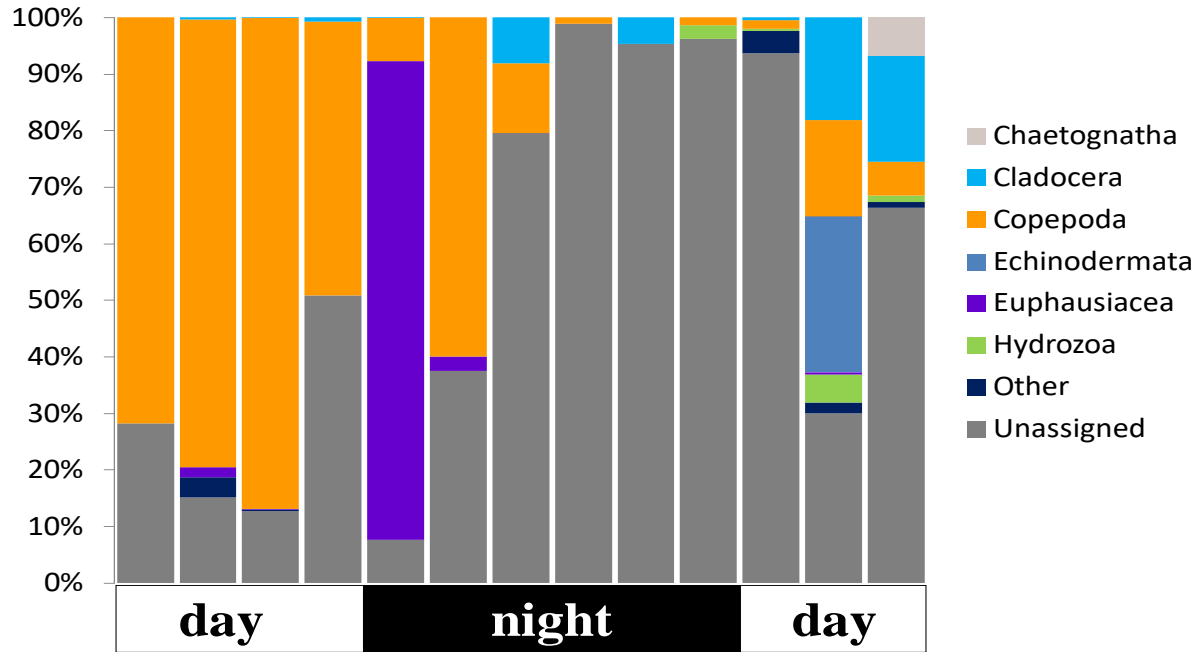# Molecular identification of sardine larval diet

- Sardines and zooplankton collected every 2 h during 26 hours diel cycle

- DNA extracted from larval guts

- Fish blocking primer

- Amplification of mtCOI gene

- Assigned OTUs GenBank

Sardine larval diet: mtCOI metabarcoding

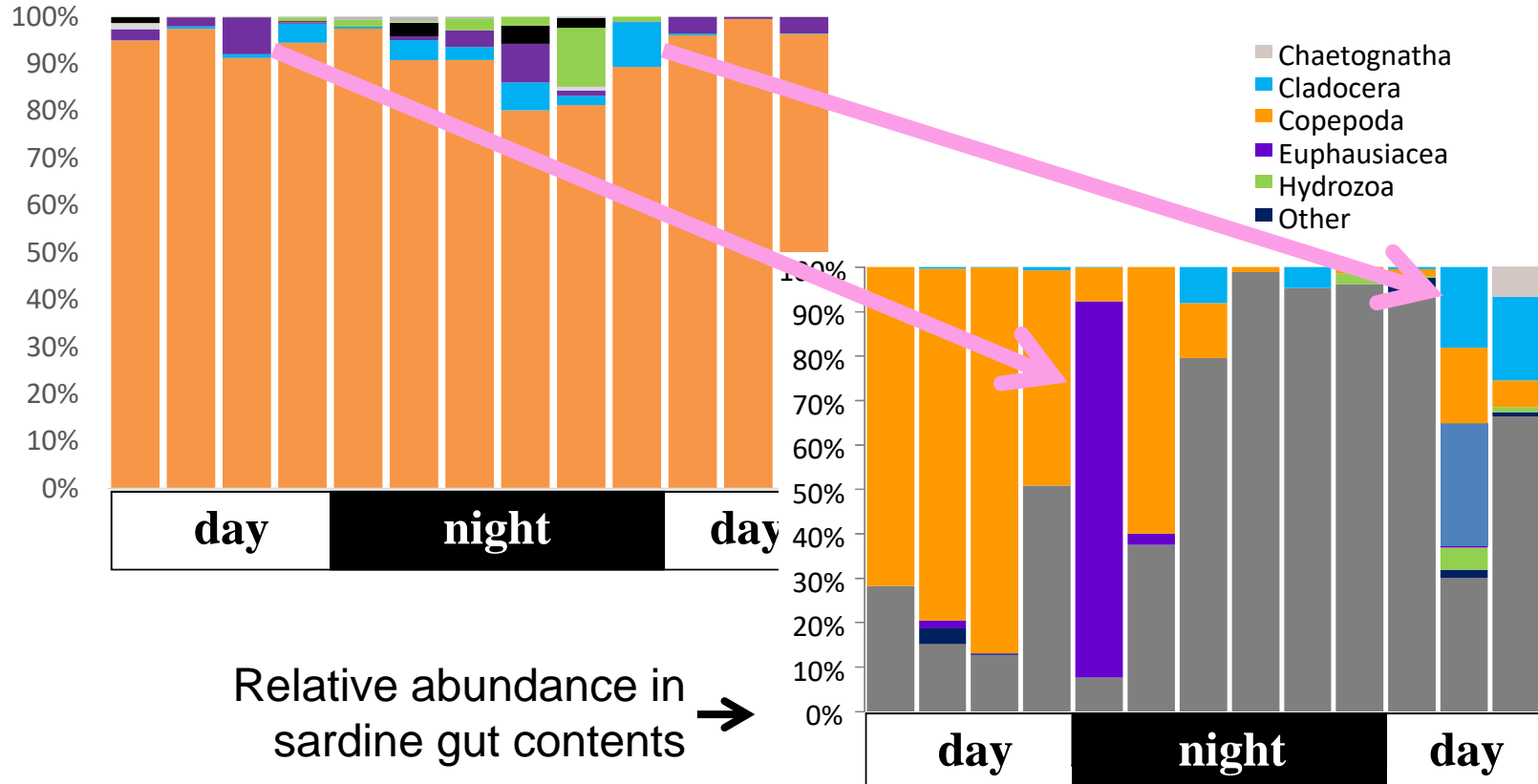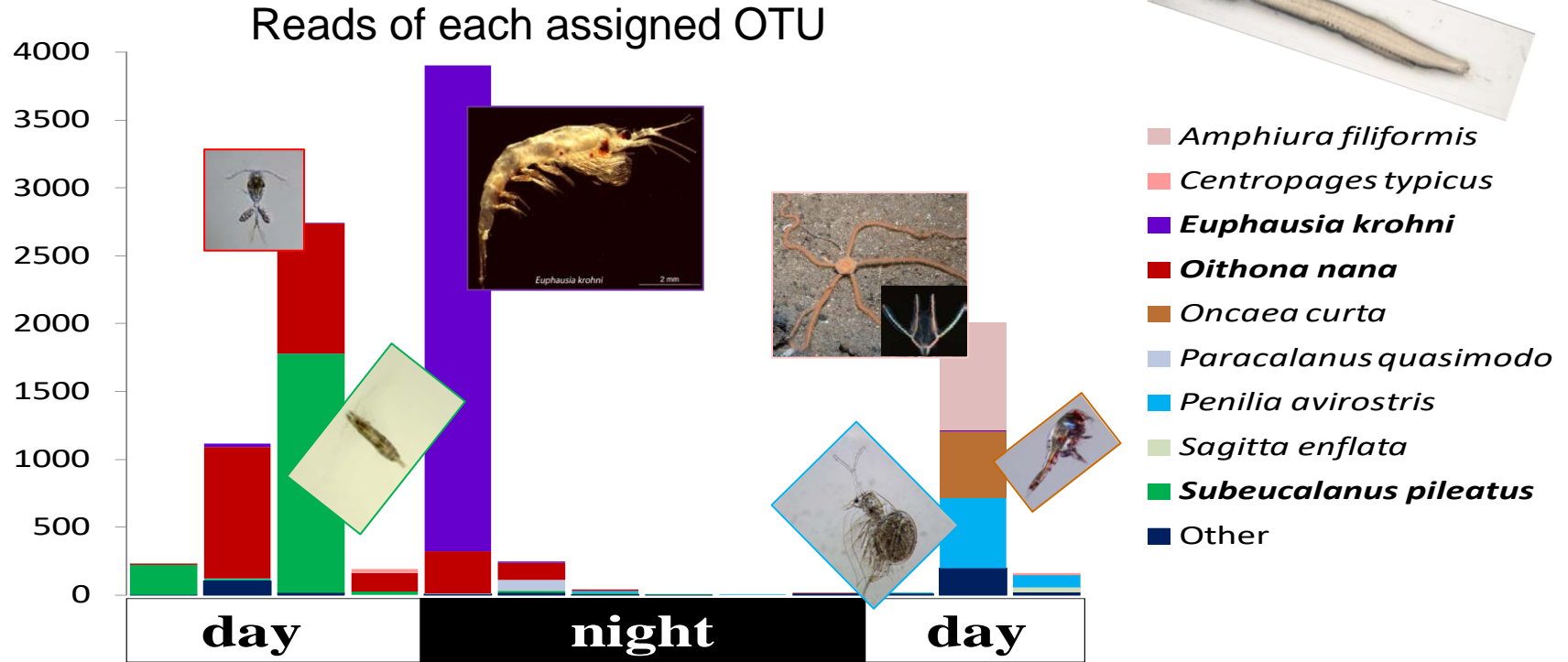Relative abundance of OTUs within sardine guts

- Assignment of OTUs decreased at night
- Main prey group were **copepods** (6-87% of reads), but also **euphausiids** (0-85%), **cladocerans** (0-19%), **echinoderms**, **hydrozoa**, **chaetognaths**...

Prey field variability: mtCOI metabarcoding

Relative abundance of field zooplankton assigned OTUs

Relative abundance in
sardine gut contents →

Generalist *vs* selective predator?

Reads of each assigned OTU

Legend:
- *Amphiura filiformis*
- *Centropages typicus*
- ***Euphausia krohni***
- ***Oithona nana***
- *Oncaea curta*
- *Paracalanus quasimodo*
- *Penilia avirostris*
- *Sagitta enflata*
- ***Subeucalanus pileatus***
- Other

Y-axis: 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000

X-axis categories: **day**, **night**, **day**

- Most frequent copepod prey was ***Oithona nana***
- Increased reads of ***E. krohni*** and ***P. avirostris*** 4 hours after field peaks
- ★ Opportunistic feeding strategy of the larvae

What if the prey field changes?

1992-2000   2010-2020

Summer coast

Autumn shelf

- Appendicularia
- Chaetognatha
- Cladocera
- Copepoda
- Copepoda nauplii
- Doliolida
- Euphausiacea
- Gastropoda

Yebra et al. 2022

Taxa	Energy density	
	Energy density	

	Season	Energy density change (kJ g^{-1} DW)
A	Spring	↘ 12-19 %
Cl	Summer	↘ 19-20 %
Cl	Autumn	↘ 1-10 %
Co	Winter	↘ 3 - ↗ 6 %
Th		
Eu		
Siphonophora	6.4	

★ Expected decrease in calories intake

Summary

- Sardine are opportunistic predators, diet depends on available preys

- Changes in prey field composition and quality are potential causes behind sardine stock decline

- Zooplankton time series are key tools for fisheries management

Acknowledgements

Naiara Rodríguez-Ezpeleta (AZTI, Spain)