

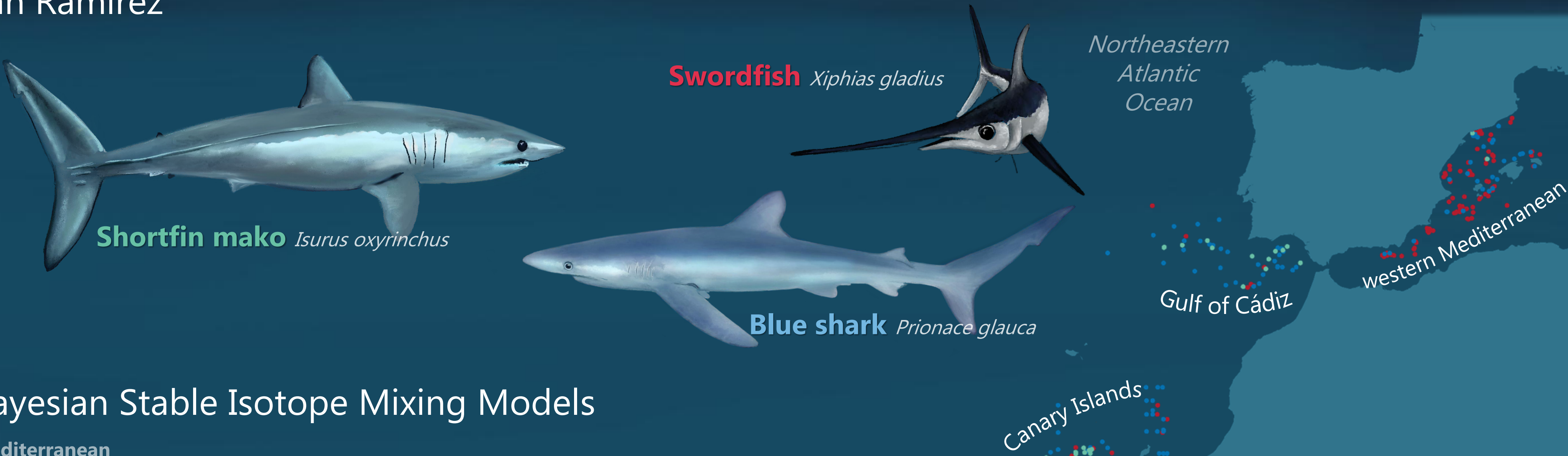
Pelagic productivity and abundance of competitors modulate trophic niche segregation between large predators



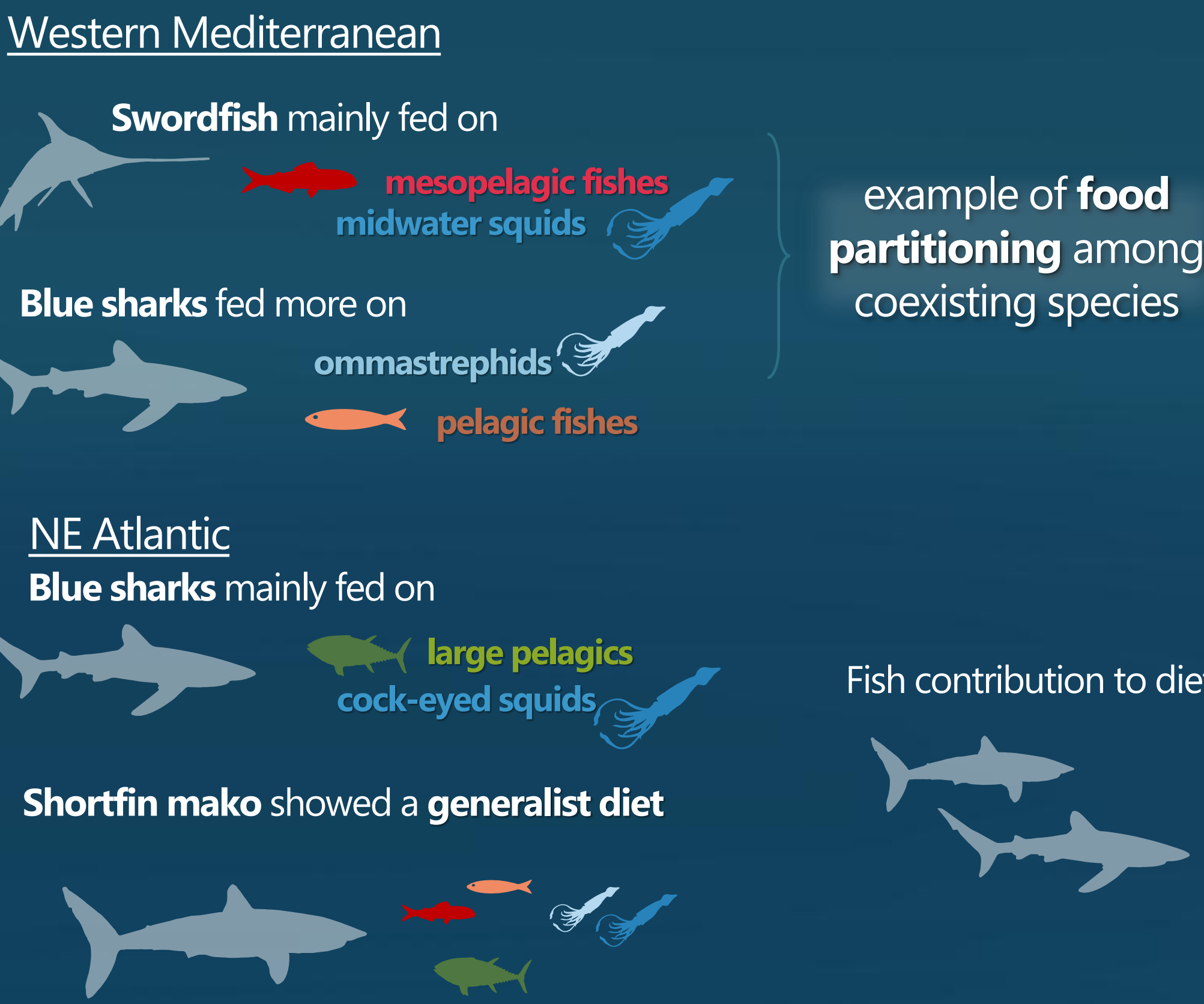
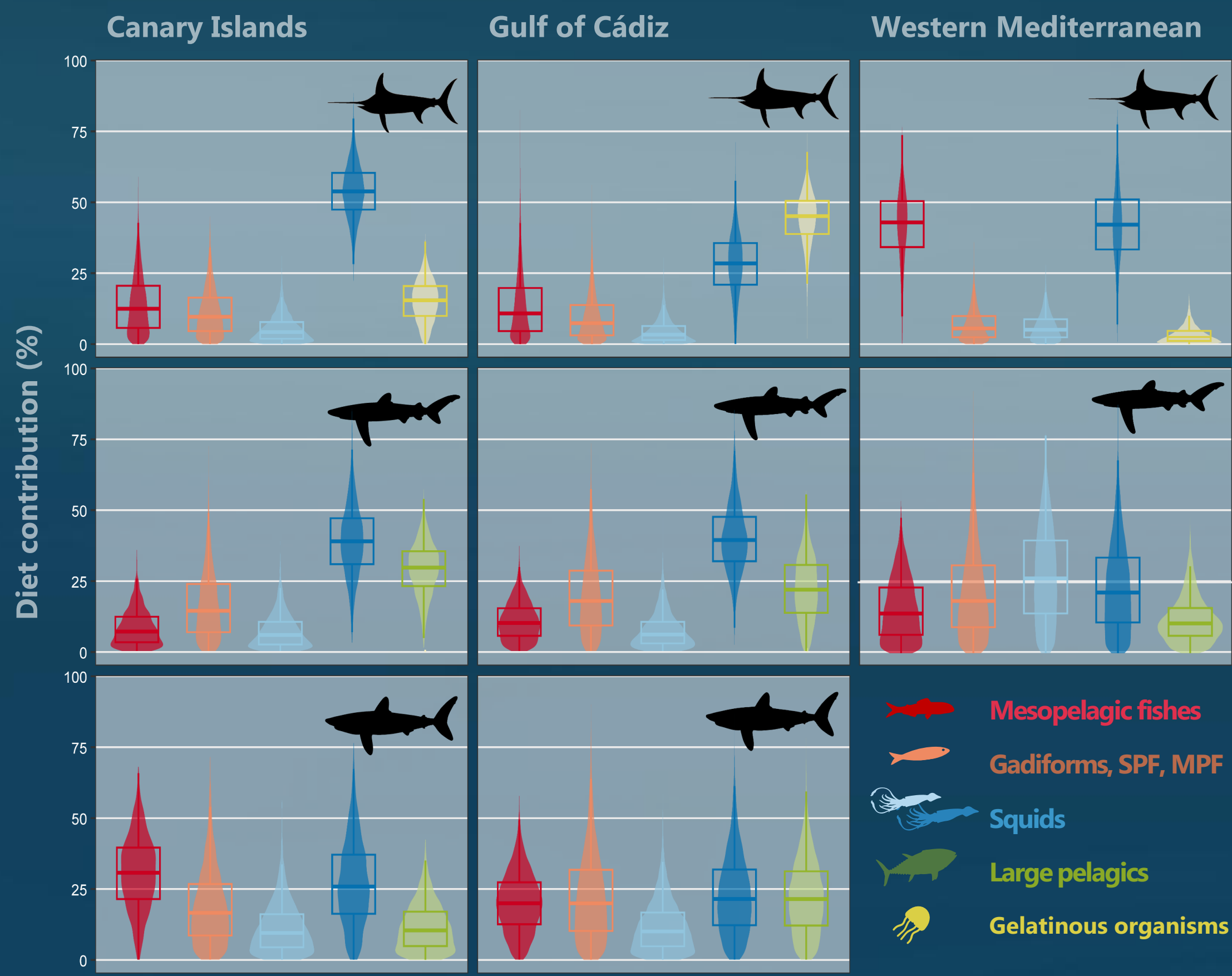
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AIM
Identify the drivers of **intra-** and **interspecific niche segregation** in large pelagic fishes



HOW?
1 We estimate **DIET PROPORTIONS** with Bayesian Stable Isotope Mixing Models



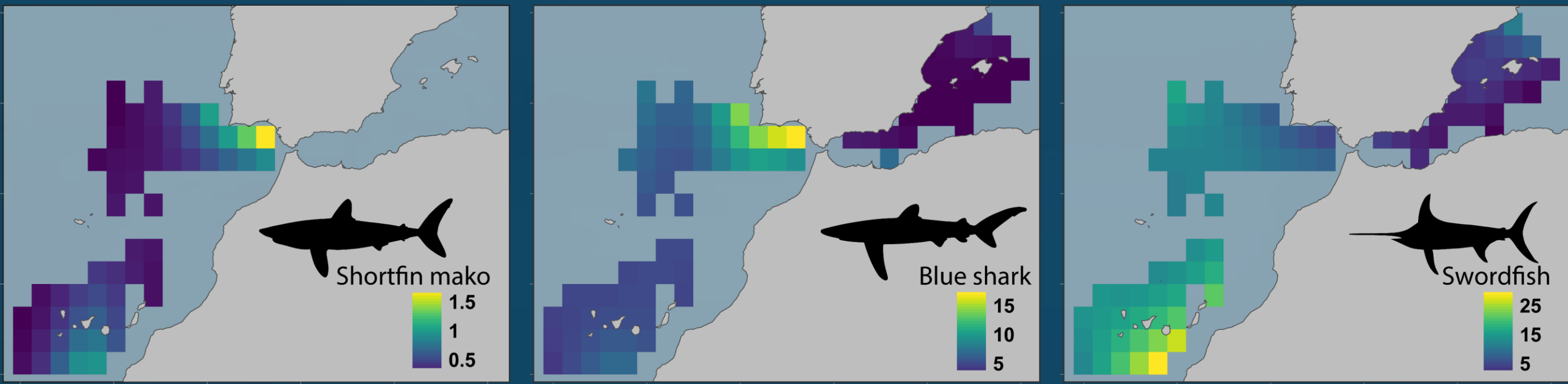
2 We estimate the **ABUNDANCE** of the competitors with Spatial Distribution Models

We used data from the Spanish longline fleet and standardized the catch per unit effort

$$n_{individuals} \sim te(LON, LAT) + longline\ type + s(boat) + s(year, month) + offset(log(n_{hooks}))$$

- The **western Mediterranean** showed the lowest densities for the three species
- Shortfin mako was the **least frequent** species

Spatial predictions of individuals/1000 hooks



3 We evaluate the **DRIVERS** influence on **COMPETITION METRICS** with Generalized Additive Models

Drivers

- Anthropogenic:
- Environmental:
- Biological:



Fishing pressure

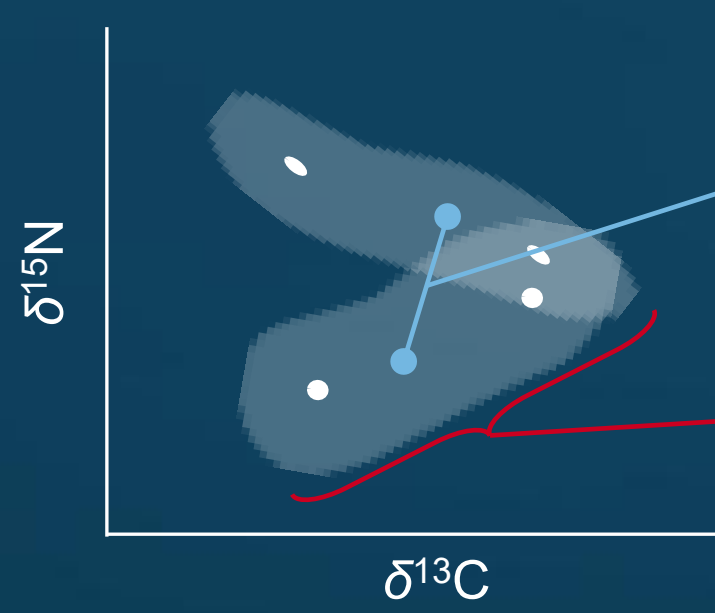


Pelagic productivity
Mixed Layer Depth



Relative abundance of competitors

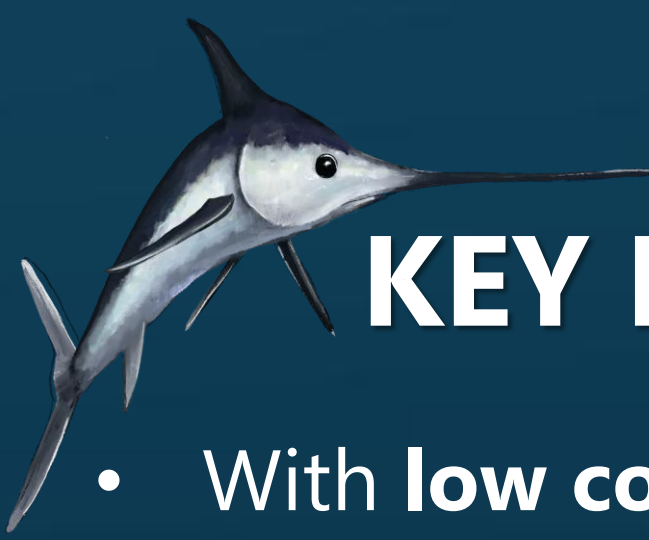
Competition metrics based on isotopic niche



Distance to the competitor centroid (CCD)
as proxy for **INTERSPECIFIC COMPETITION**

Intraspecific Trophic Pressure (ITP)
as proxy for **INTRASPECIFIC COMPETITION**

$$ITP_i = Abundance_i / (niche\ width_i)$$

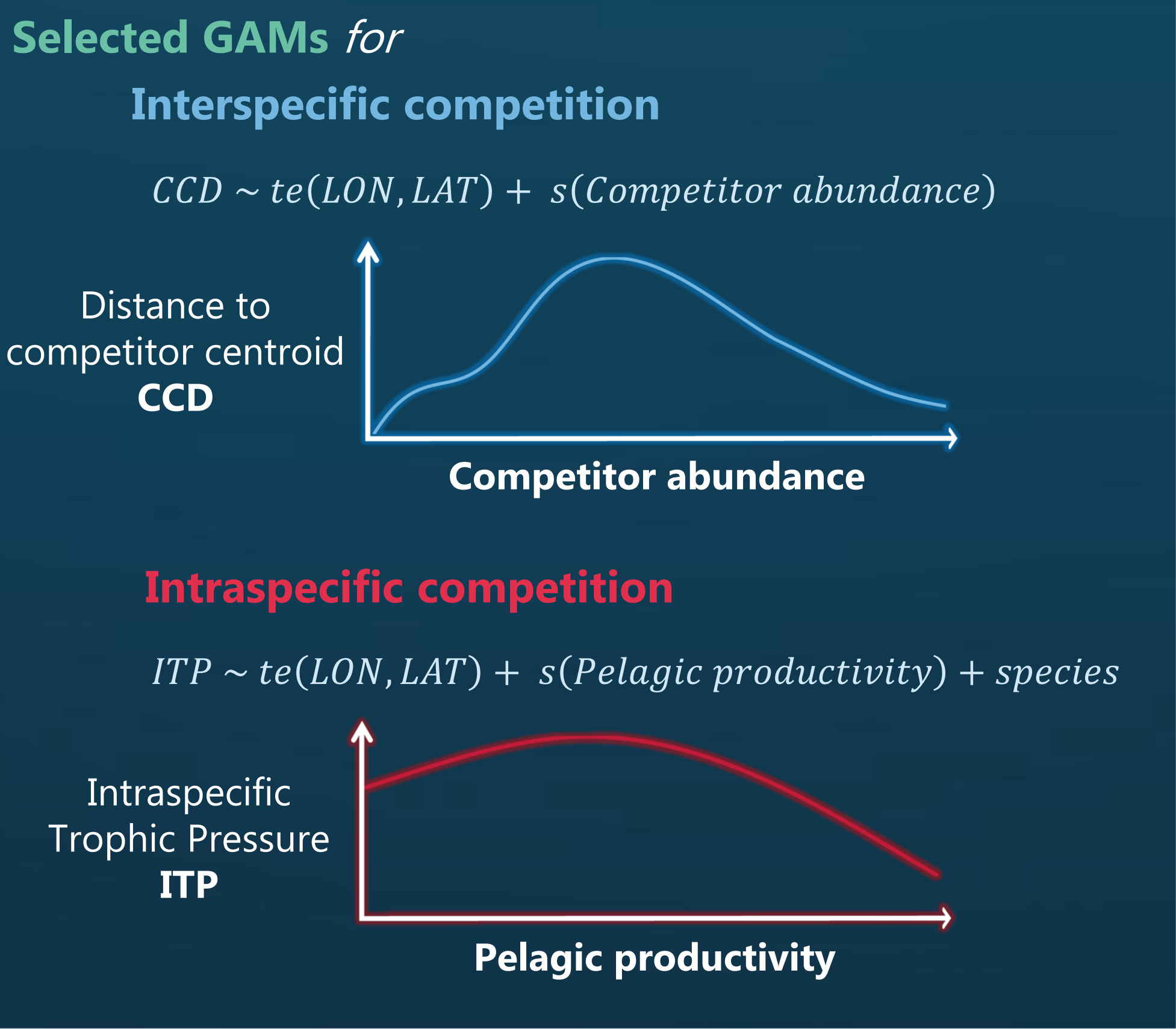


KEY FINDINGS

- With **low competitor abundances**, niche differentiation among species is not needed → low CCD
- As competitor numbers increase, species may diversify their niches → high CCD
- At **high competitor abundances**, species may broaden their individual niches to avoid conspecific overlap, reducing distance to competitors' centroid → low CCD
- Under **high pelagic productivity**, intraspecific competition (ITP) is generally low.
- Under **low productivity**, conspecifics compete intensely → high ITP

High productivity reduces competition → niche differentiation depends on **competitor abundance**

Low productivity increases competition → **more competitors** push for niche diversification, and increase intraspecific pressure



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Fernández-Corredor et al. (2025). *Proc. R. Soc. B.* 292:20251809.

Read the paper here



Illustrations from Joan Mir-Arguimbau