

# Can resource competition explain the forage fish population dynamics in the central Baltic Sea?

Using stable isotopes, DNA metabarcoding and microscopy, we assessed the diet of sprat, herring and stickleback in the central Baltic Sea over the seasons

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## Conclusions

Resource competition between sprat and herring in spring, when prey availability is more limited, may drive the decline of clupeids and the increase of stickleback.

In autumn, diet overlap, used as a proxy for competition, is limited between forage fish.

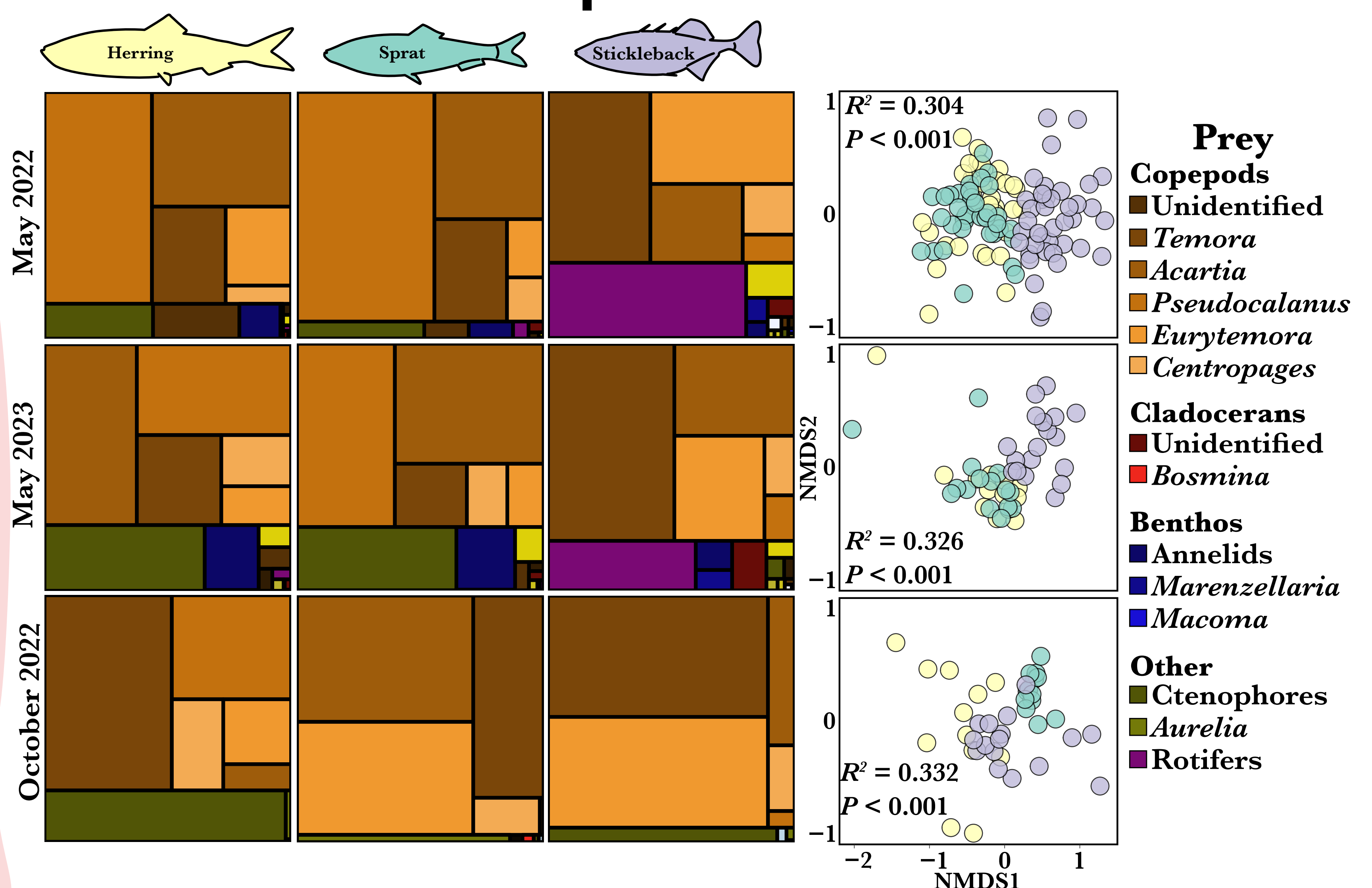
Together, our results suggest that competition for resource may explain the increase of stickleback, but only partially the decline of clupeids.

## Results

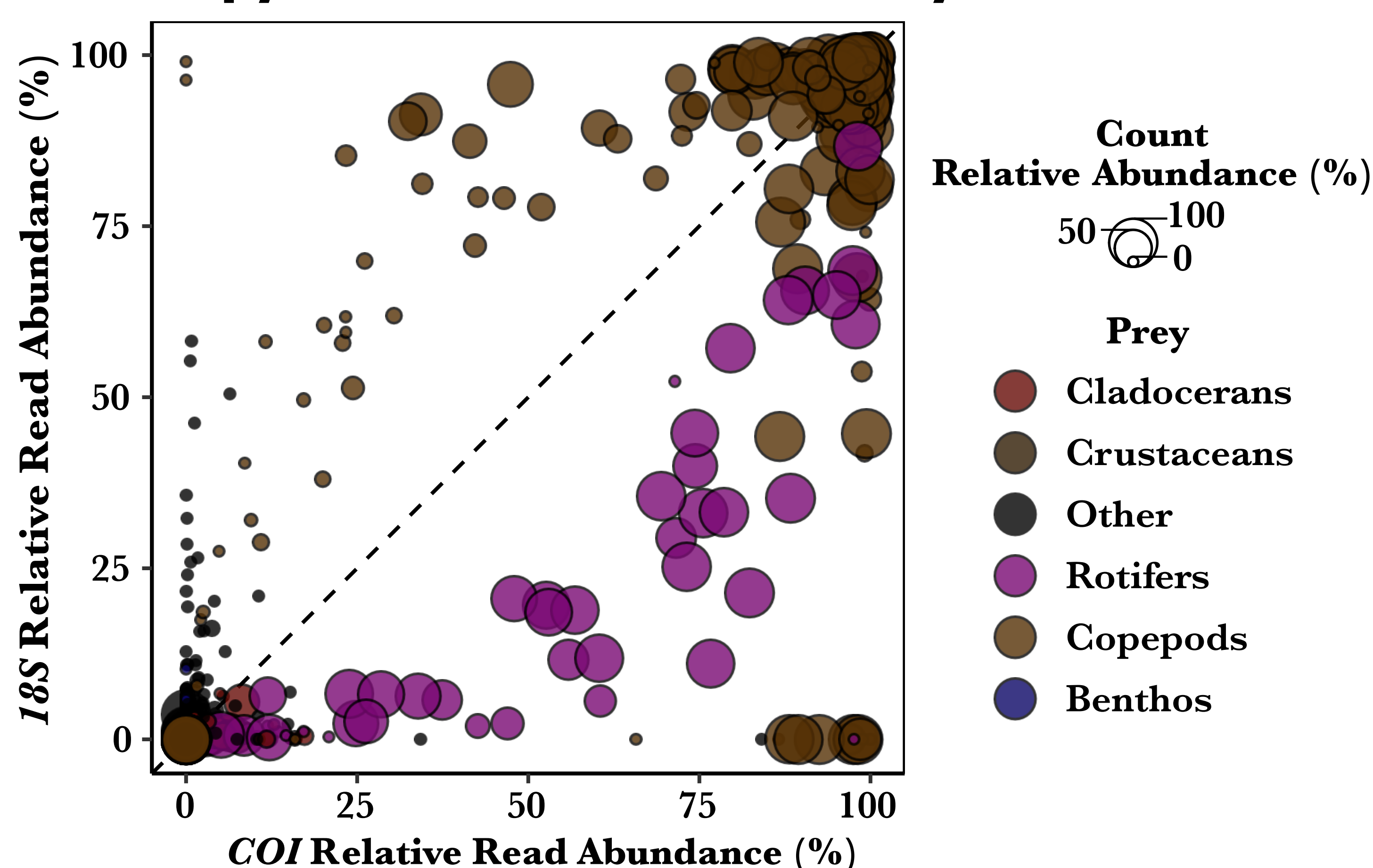
In spring, sprat and herring shared similar resources, mainly comprising the copepods *Pseudocalanus* and *Acartia*, whereas stickleback had different prey and was the only fish feeding on the rotifer *Synchaeta*. All fish species had similar  $\delta^{15}\text{N}$  ranging from 9.67 to 10.1‰, but stickleback showed lower  $\delta^{13}\text{C}$  than the clupeids. This suggests that in spring, stickleback occupied a different niche than the clupeids, as supported by DNA metabarcoding.

In autumn, different prey assemblages were identified across species mainly composed by various copepod species, and ctenophores for herring. Autumn isotopic signatures varied across fish; herring had the highest  $\delta^{15}\text{N}$ , while sprat had lowest  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$ , indicating different trophic positions and carbon sources between all fish.

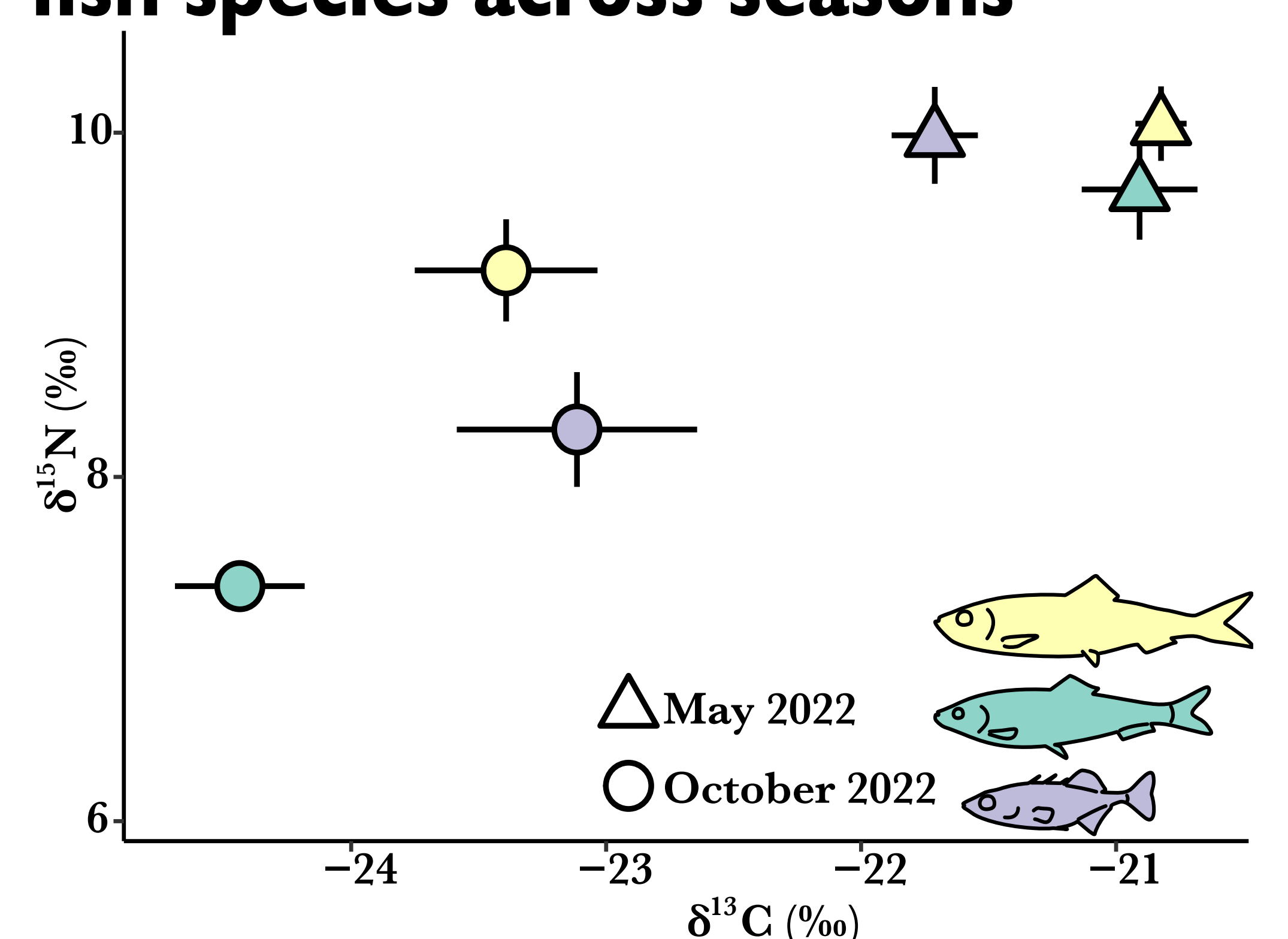
## DNA metabarcoding revealed different trophic interactions across species and seasons



Similar patterns were observed with microscopy, but at lower taxonomy resolution



## Stable isotopes ratios varied between fish species across seasons



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