

# Food web functioning of the benthopelagic community in a deep-sea seamount based on diet and stable isotope analyses

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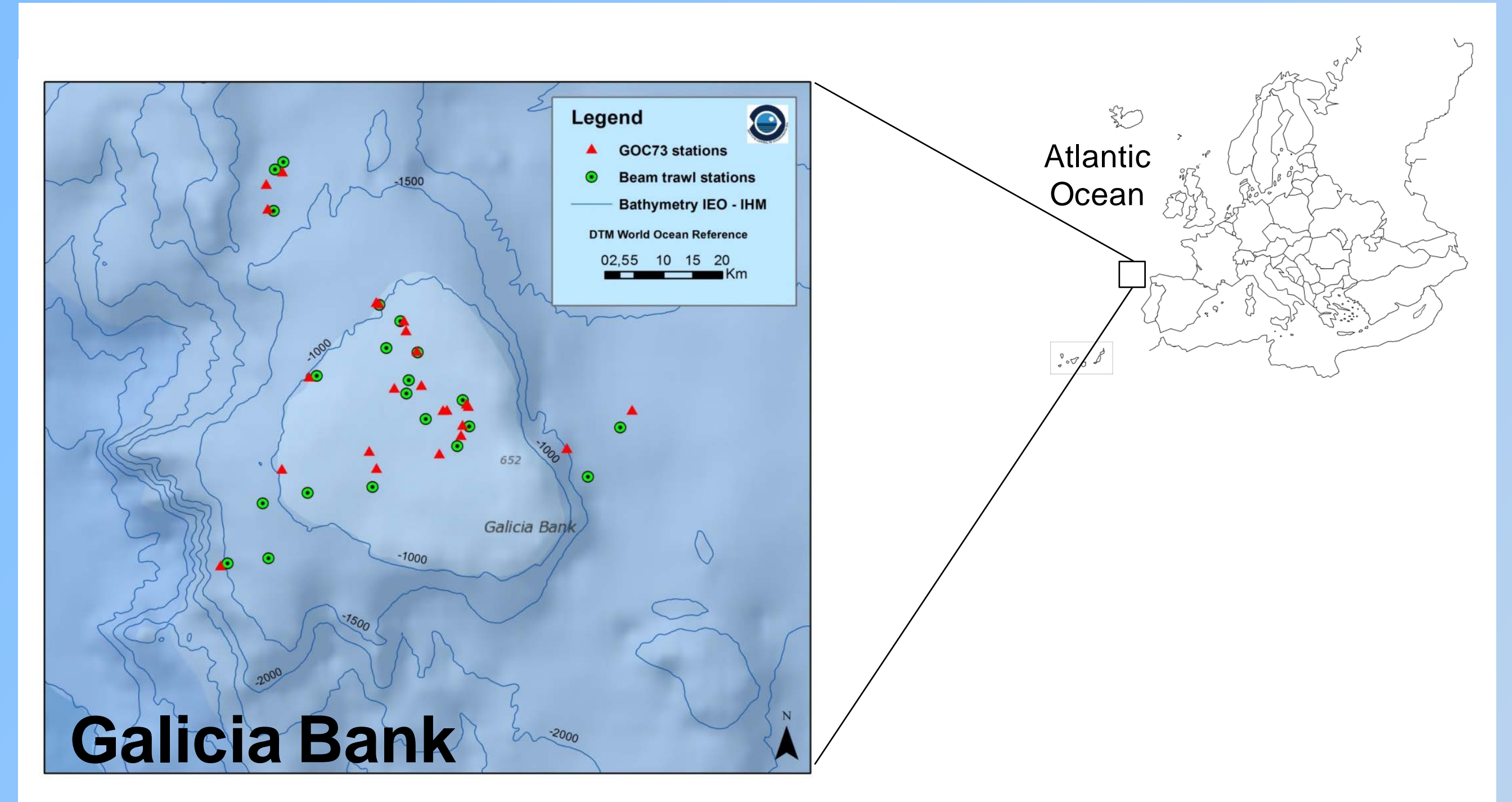
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## INTRODUCTION

Trophic interactions in the deep-sea fish community of the seamount Galicia Bank (NE Atlantic) was inferred by using stomach contents (SC) and stable isotope analyses (SIA) of 26 fish species and their main prey. Stable-isotope-based estimates of trophic position provide a powerful fusion of trophic level and food web paradigms for evaluating trophic structure of marine food webs (Peterson and Fry, 1987; Post, 2002). To obtain the level of resolution required to discern complex trophic interactions, SIA analyses must be used in conjunction with other complementary information, such as direct diet analyses (Boyle et al 2012).



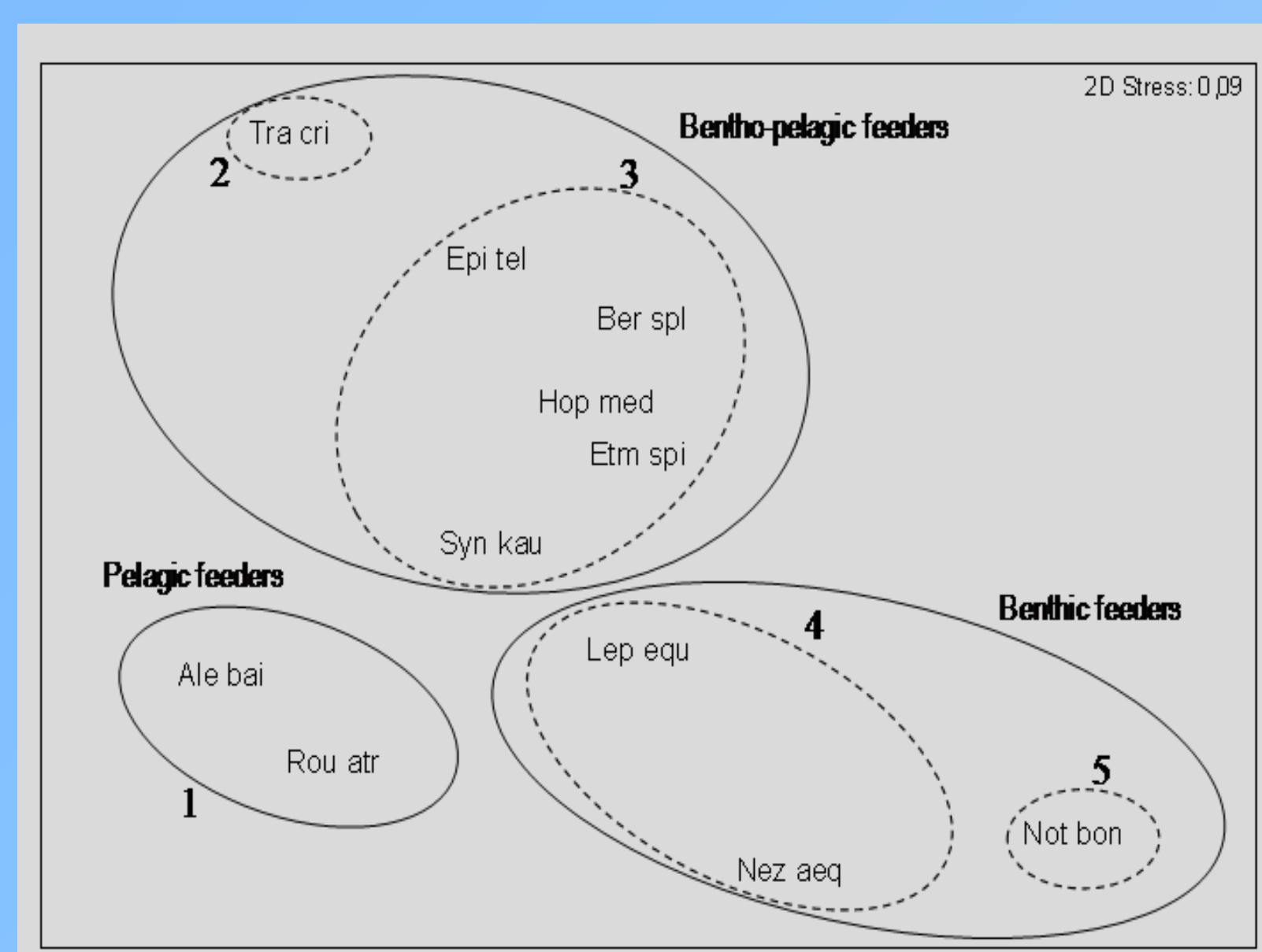
## MATERIAL AND METHODS

Three surveys were carried out in summers' 2009, 2010 and 2011, between 625 and 1800 m depth. Faunistic compartments were sampled using GOC73 (megabenthic fauna) and beam trawl (epibenthic assemblages). Specimens from each station were sorted by species and identified to species level. A total of 26 fish species were dissected and stomach contents analysed. Only fish species with at least 10 full stomachs were used in the multivariate analyses (11 fish species). To identify trophic guilds based on diet composition, quantitative differences between the 11 fish species were addressed by multidimensional scaling (MDS).

SIA analyses were also performed in 23 predators and 10 prey. To estimate the trophic level (TL) of predators, *Phronima sedentaria* was used as baseline (TL = 2).

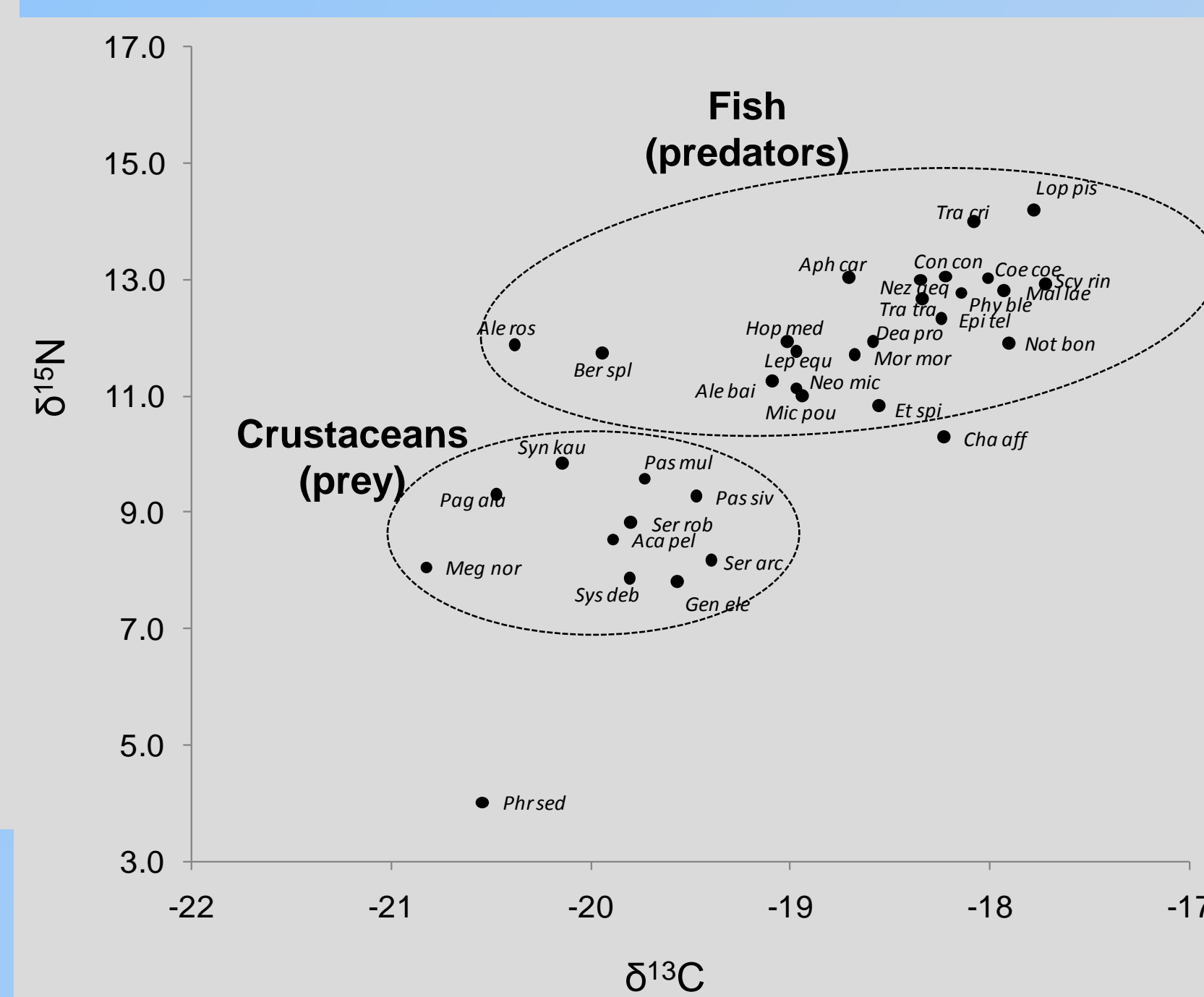
## RESULTS

### Stomach contents (SC)



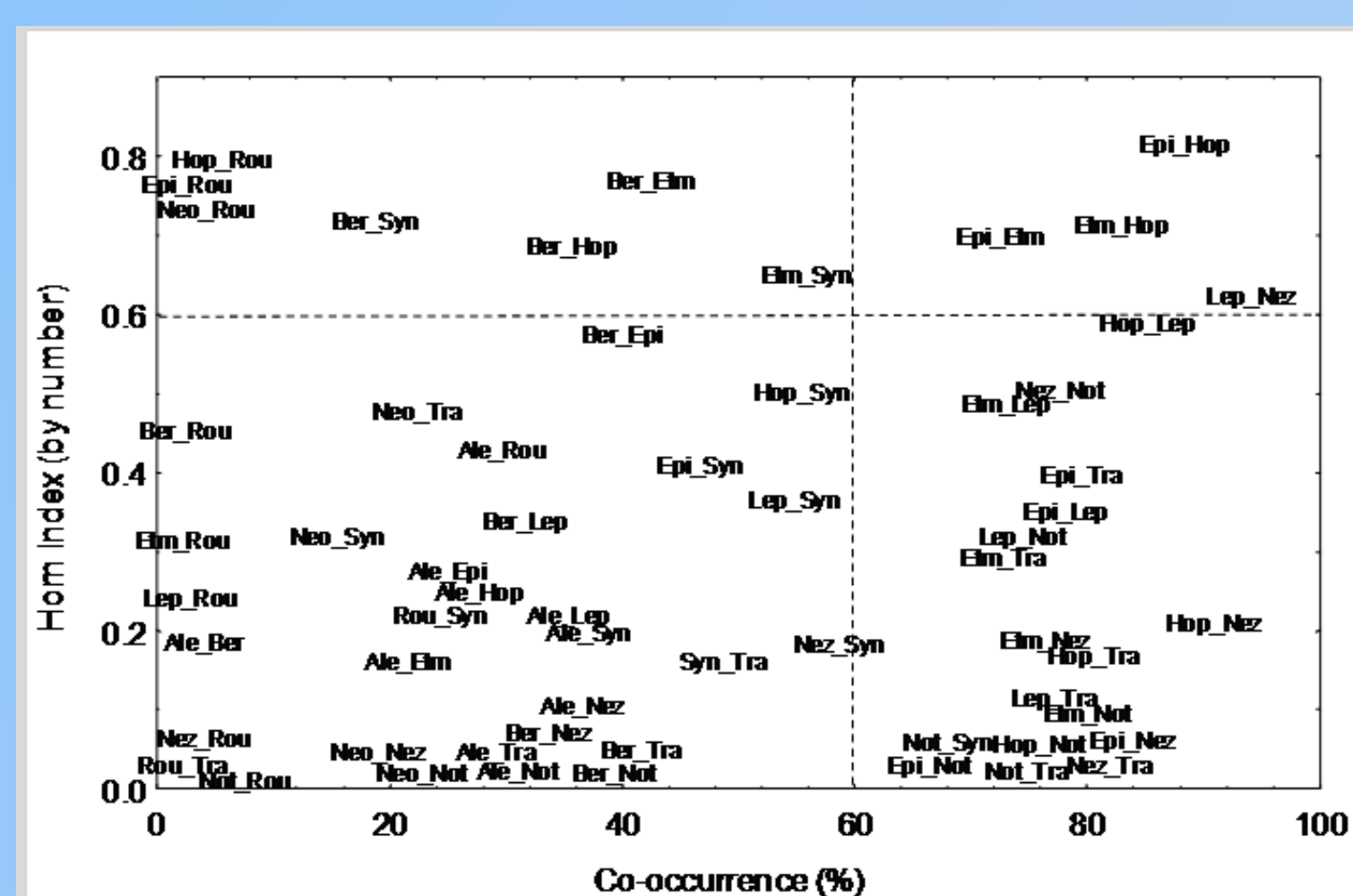
Three main trophic guilds were identified: i) pelagic feeders, ii) benthopelagic feeders and iii) benthic feeders.

### Stable isotopes (SIA)

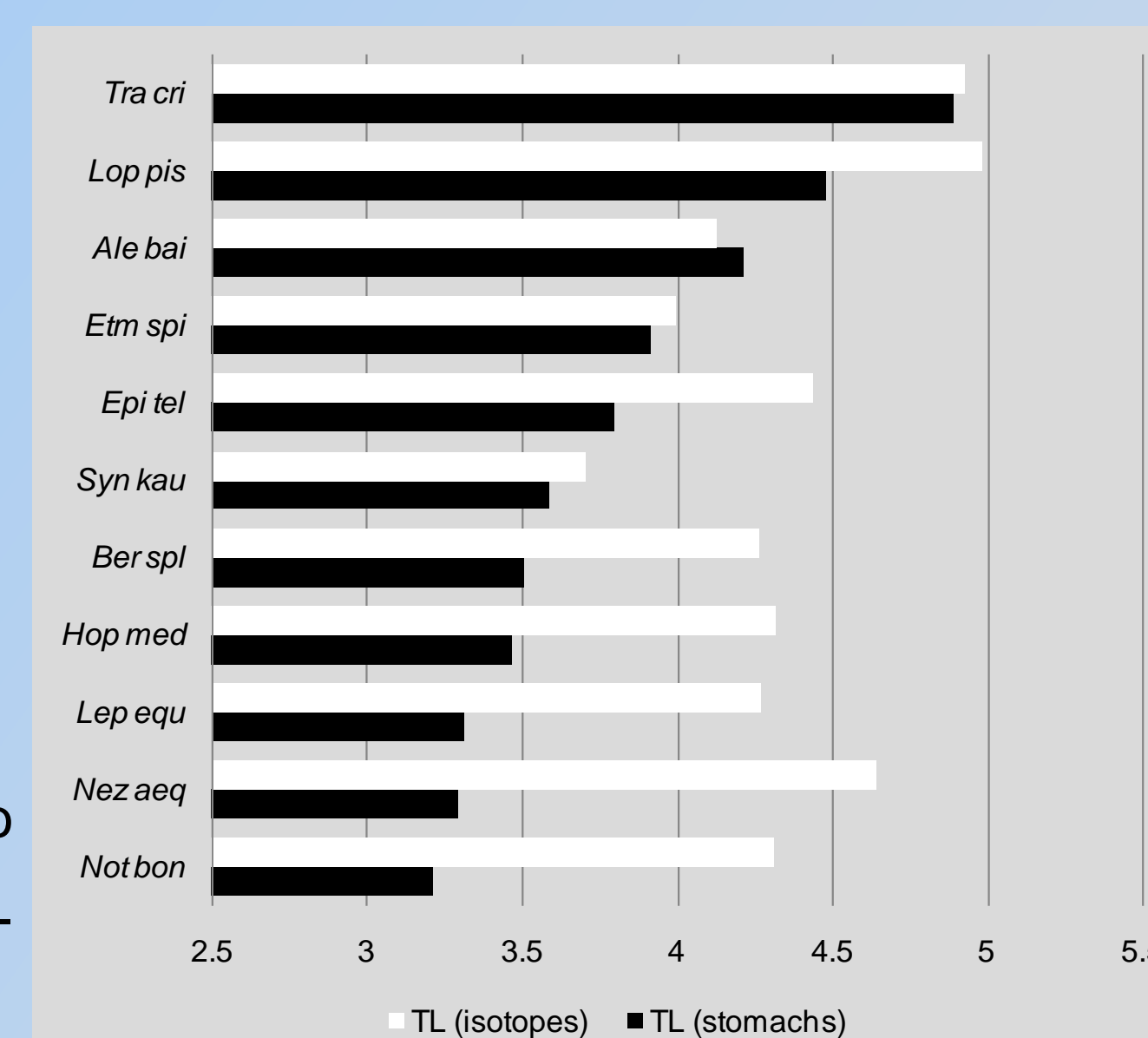


ABBREV.	SPECIES	ABBREV.	SPECIES
Aca pel	<i>Acanthephyra pelagica</i>	Mic pou	<i>Micromesistius poutassou</i>
Ale bai	<i>Alepocephalus bairdii</i>	Mor mor	<i>Mora moro</i>
Ale ros	<i>Alepocephalus rostratus</i>	Neo mic	<i>Neoscopelus microchir</i>
Aph car	<i>Aphanopus carbo</i>	Nez aeq	<i>Nezumia aequalis</i>
Ber spl	<i>Beryx splendens</i>	Not bon	<i>Notacanthus bonapartei</i>
Cha aff	<i>Chaceon affinis</i>	Pag ala	<i>Pagurus alatus</i>
Coe coe	<i>Coelorrhynchus coelorrhynchus</i>	Pas mul	<i>Pasiphaea multidentata</i>
Con con	<i>Conger conger</i>	Pas siv	<i>Pasiphaea sivado</i>
Dea pro	<i>Deania profundorum</i>	Phr sed	<i>Phronima sedentaria</i>
Epi tel	<i>Epigonus telescopus</i>	Phy ble	<i>Phycis blennoides</i>
Etm spi	<i>Etmopterus spinax</i>	Scy rin	<i>Scymnodon ringens</i>
Gen ele	<i>Gennadas elegans</i>	Ser arc	<i>Sergestes arcticus</i>
Hop med	<i>Hoplostethus mediterraneus</i>	Ser rob	<i>Sergia robusta</i>
Lep equ	<i>Lepidion eques</i>	Syn kau	<i>Synphobranchius kaupii</i>
Lop pis	<i>Lophius piscatorius</i>	Sys deb	<i>Systemia debilis</i>
Mal lae	<i>Malacocephalus laevis</i>	Tra tra	<i>Trachyrhynchus trachyrhynchus</i>
Meg nor	<i>Meganyctiphanes norvegica</i>	Tra cri	<i>Trachyscorpia cristulata</i>

According to SIA analyses *Lophius piscatorius* and *Trachyscorpia cristulata* constitute the top-predators in the benthopelagic food web of Galicia Bank. Fish and crustaceans appeared split into two well-distinguished groups, reflecting predator-prey relationships (1 TL).



High potential competition for food was observed between two benthic feeders (*N. aequalis* and *L. eques*), and three benthopelagic feeders (*E. telescopus*, *H. mediterraneus* and *E. spinax*).



Trophic level estimations based on stable isotope analyses (SIA) were always higher than that based on stomach contents, except for the species *Alepocephalus bairdii*.

## CONCLUSIONS

During summer, functioning of benthopelagic food web in Galicia Bank are more influenced by communities dwelling the water column than by deep-sea benthos. Vertical migrating benthopelagic shrimps and macro-zooplankton, mainly euphausiids and mysids, were identified to play a key role in the Galicia Bank food webs, unlike benthic fauna which was found as a pauperized compartment. However, according to SIA analyses, benthic component appeared to gain importance in previous months. These results demonstrate that both approaches, SC (snapshot of diet) and SIA (assimilated food), provide complementary views of food web functioning and dynamics in different seasons.