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Around 71 *Anisakis* a day (26000 yearly) on average may be transferred to common dolphins in Iberian Atlantic waters from their local main prey species. Models indicate sardines as the most 'efficient' route of transfer, and blue whiting as the most significant route in terms of *Anisakis* quantity.

Modeling transference levels of *Anisakis* parasites from main prey species to common dolphin in the Northeast Atlantic Ocean

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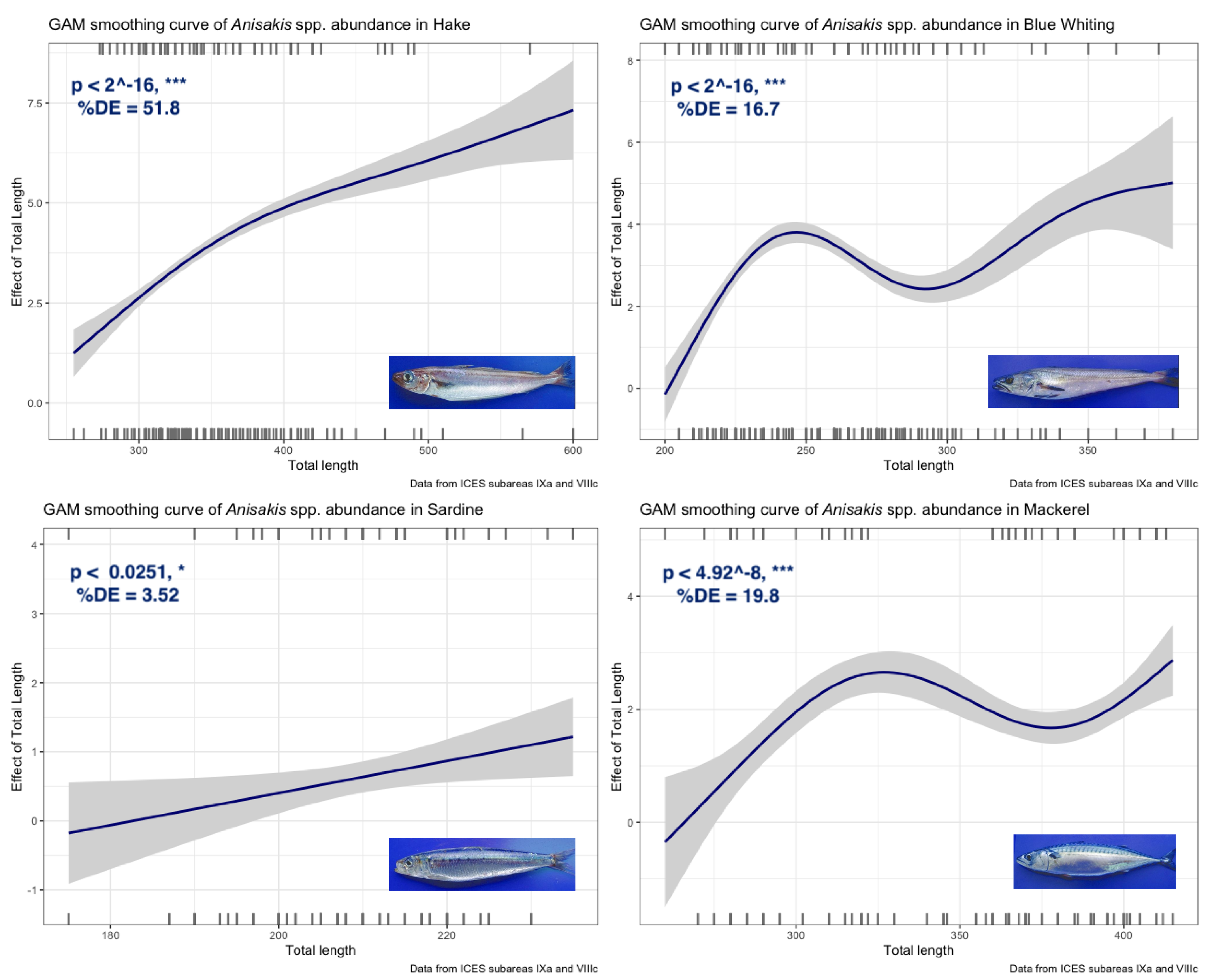
INTRODUCTION

- Cetaceans can be intensely infected with *Anisakis* and are their main source back to the marine environment.
- *Anisakis* pose a threat to cetaceans and humans.
- Monitoring is essential, yet efforts are only aimed at the intermediate hosts – i.e. fishery products (fish and squids).
- Here, trophic transfer flow of *Anisakis* to cetaceans is quantified for the first time, using *Delphinus delphis* (DDE) and its main four prey species in Iberian Atlantic waters as a case study to try to fill this knowledge gap in cetacean parasitology and improve *Anisakis* monitoring.

RESULTS



METHODS

- Diet data from N = 754 DDE stranded between 1998 – 2018 from Galicia (data on preys and total length).
- *Anisakis* abundance data on N = 923 fish (blue whiting, hake, sardine and mackerel) from scientific fishing in ICES IXa and VIIIc between 2013 – 2015.
- Models and predictions were done using GAMs – total length as the explanatory variable of *Anisakis* abundance

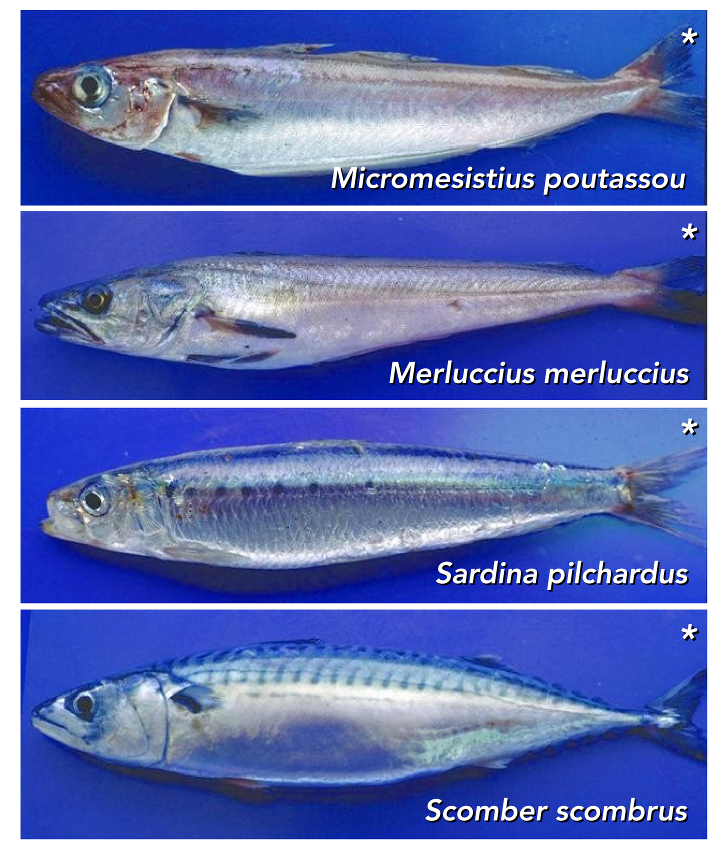
DISCUSSION

- Results are considered conservative, as the four fish species selected represent 87% in weight of their diet.
- *Anisakis* can produce an average of one million eggs per female[1], elevating potential transfer of eggs to the environment to billions just from Iberian Atlantic DDE.
- *Anisakis* flow at the ecosystem level has yet to be quantified, but current results show DDE may play a big role in Iberian Atlantic waters.
- Cetacean infection monitoring programs should be considered, even if under a human health framework.

	Population	DDE abundance[2]	*Anisakis*/Day (million)	*Anisakis*/ DDE/Year	*Anisakis*/Year (million)
Standardized to 5.83 Kg/day/DDE	Cádiz (AA)	18458	1.31	25915	478.34
	Portugal/Rías Baixas (AB)	63243	4.49		1638.94
	Cantábrico (AC)	71082	5.05		1842.09
	11	34570	2.45		895.88
	12	643	0.05		16.66
	13	3110	0.22		80.6
	TOTAL	191106	13.57		4952.51
Prevalence	88.95				4405.26

Prey species	N.° DDE with prey in their stomachs	Prey prevalence (%)	Prey total length (mean, mm)	Maximum prey size considered (mm)	Prey abundance/DDE (mean)	*Anisakis* prevalence in DDE (%)	Predicted *Anisakis* transfer (mean)
Blue whiting	346 (754)	45.89	165.63 ± 36.81 (35 – 429)	380.00	87 ± 350 (1-6210)	55.49 (192)	87 ± 302 (0 – 3436)
Hake	252 (754)	33.42	192.37 ± 71.52 (16 – 608)	600.00	10 ± 18 (1-219)	70.24 (177)	29 ± 67 (0 – 546)
Sardine	250 (754)	33.16	184.32 ± 10.90 (129 – 287)	235.00	11 ± 21 (1-252)	86.45 (217)	12 ± 21 (1 – 191)
Mackerel	72 (754)	9.55	271.33 ± 70.44 (71 – 433)	415.00	3 ± 3 (1-19)	62.5 (45)	11 ± 20 (0 – 83)
TOTAL	561 (754)	74.40	*Minimum sizes may be calculation artifacts*		*** Different prey in multiple stomachs*	82.71 (464)**	74 ± 244 (0 – 3473)
TOTAL (daily)	561 (754)	74.40				88.95 (499)**	71 ± 170 (0 – 2278)

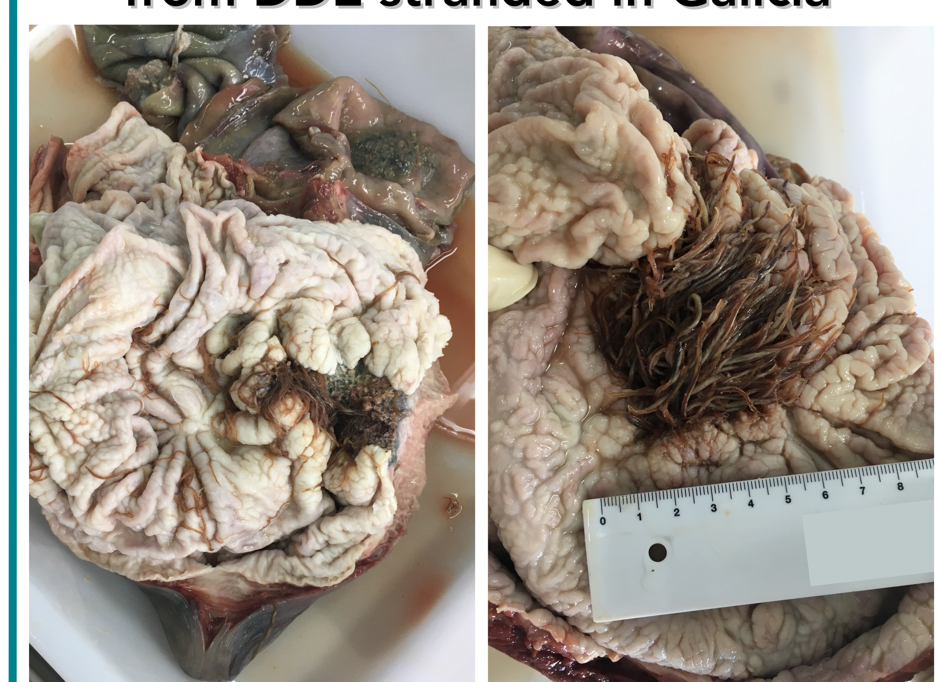
Main DDE prey in Galician waters



Anisakis infected hake from ICES IXa

DDE stomach contents

Heavily *Anisakis* infected stomachs from DDE stranded in Galicia



Future work

- Validate model results with infection data from stranded cetaceans.
- Extend the analyses to other cetacean species.
- Update models with most recently available parasitological data on prey species.

1. Ugland et al., 2004
2. Hammond et al., 2022
* Fish images from Mariano Garcia Rodriguez (Fishbase)