A multimethod approach to analyse the dietary composition of the Baltic grey seal (*Halichoerus grypus*) in the southern Baltic

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Deutsches Meeresmuseum Stralsund

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Introduction

- Grey seals recover in the whole Baltic Sea (1)
- Northern pike (*Esox lucius*) population in the German coastal areas decrease (2,3)
- Pike was described as an important prey species of grey seals in Swedish coastal areas (4,5)
- The potential predation effect of the largest Baltic predator, the grey seal, on the local pike population in the southern Baltic area is unknown (3)
- Commercial and recreational fishermen report gnawed pike (Fig 1.), but to date no pike hart structures were found in morphological stomach content analyses (3)
- Does the morphological diet analyses underestimate pike as a grey seal prey?

Fig.1: Gnawed pike found in commercial gear with lesions typical for grey seal predation (3) © Steffen Schnorrenberg

Fig. 2: Area of sample collection in the southern Baltic

Methods

- Grey seal diet samples (stomach and intestine content) were collected during necropsies within of the German Oceanographic Museum in Mecklenburg-Western Pomerania
- Morphological analysis of 27 stomach and 13 intestinal content samples
- 16S rRNA gene targeted for DNA metabarcoding using a combination of existing primers(6) and newly designed primers (5 of 127 samples analysed and shown, ongoing study)

Comparison of the Methods

Consumed biomass calculation (7,8)	✓	✗
Fish length (7,8)	✓	✗
Selective consumption (soft tissue) (5)	✗	✓
Small prey species (9)	✓	✓
Retention bias due to digestion (10,11)	✓	✗
Secondary prey identification	✗	✗

Results

Abundance of prey species

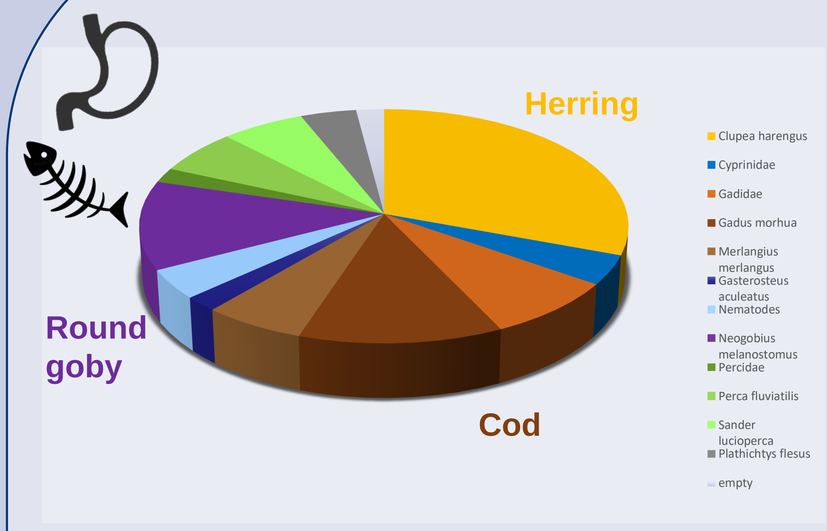


Fig. 3: Proportion of species found per analyzed stomach of grey seal (n=27).

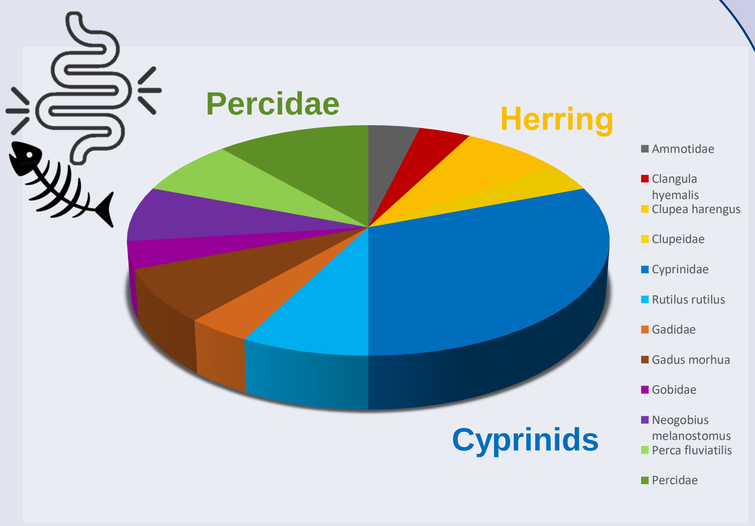


Fig. 4: Proportion of species found per analyzed intestine of grey seal (n=13).

Direct comparison of methods:

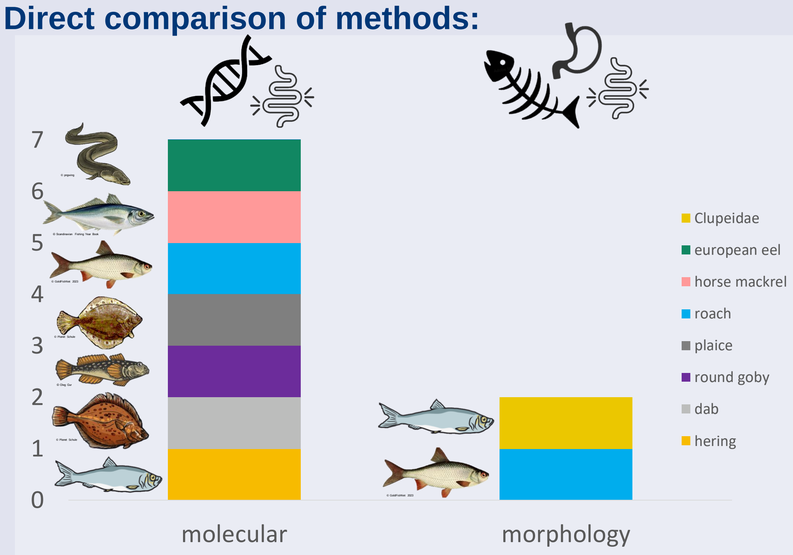


Fig. 5: Number of species detected in intestinal sample of an adult male grey seal (229cm), found in October 2017, Thiessow. Morphological analysis of stomach content resulted in total biomass (8) hering = 378g, roach = 610g.

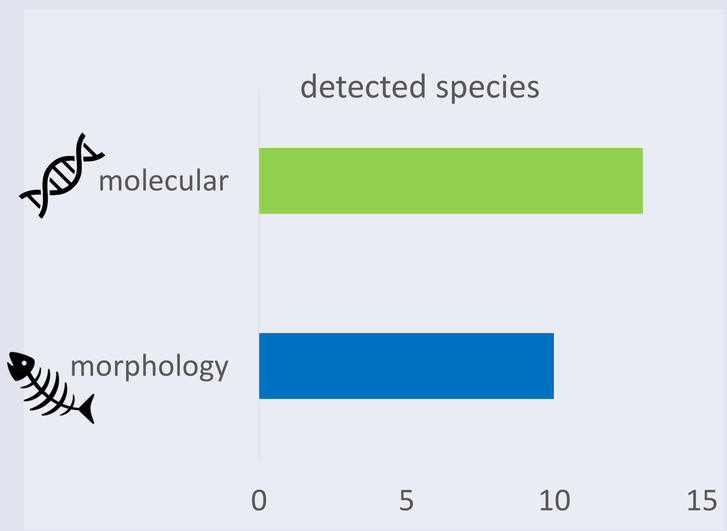
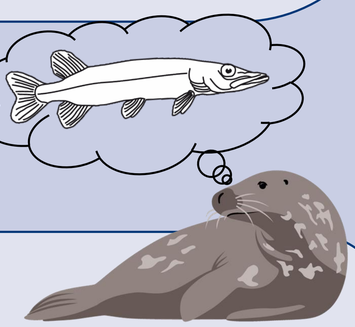


Fig. 6: Number of species detected in 40 morphological samples and 5 molecular samples.



Conclusion

More taxa of the diet are identifiable using DNA metabarcoding. Yet morphological analysis is the only method to accurately calculate consumed biomass.

Dietary analysis of top predators play an important role in understanding changes in ecosystems and food webs, as grey seal populations are increasing and new foraging patterns may adopt.

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