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Predicting diversity hotspots using data from scientific fisheries surveys
An example using Decapod species



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Introduction

To meet requirements for the ecosystem approach implemented in the Marine Strategy Framework Directive (MSFD), it is necessary to intensify existing monitoring programs. Apart from the data gathered on targeted species on annual fishery surveys, data on benthic species are recorded as well. This approach uses the existing data of epibenthic invertebrate species in fishery surveys for distribution monitoring.

Single species analysis

Methods

Data collected during two annual surveys (DYFS and GASEEZ) were compiled to predict the distribution of the brown shrimp *Crangon crangon* in the German EEZ of the North Sea for two years with a generalised additive model (GAM). Depth, sediment type and habitat type were used as predictors.

Distribution of *Crangon crangon*

In the years 2005 and 2009 the observed abundance of the brown shrimp decreased with the water depth. The coastal region was identified as core habitat, where the MPA's cover most of the area (Fig. 1). This identified pattern is similar to other studies analyzing the spatial distribution of *Crangon crangon.*

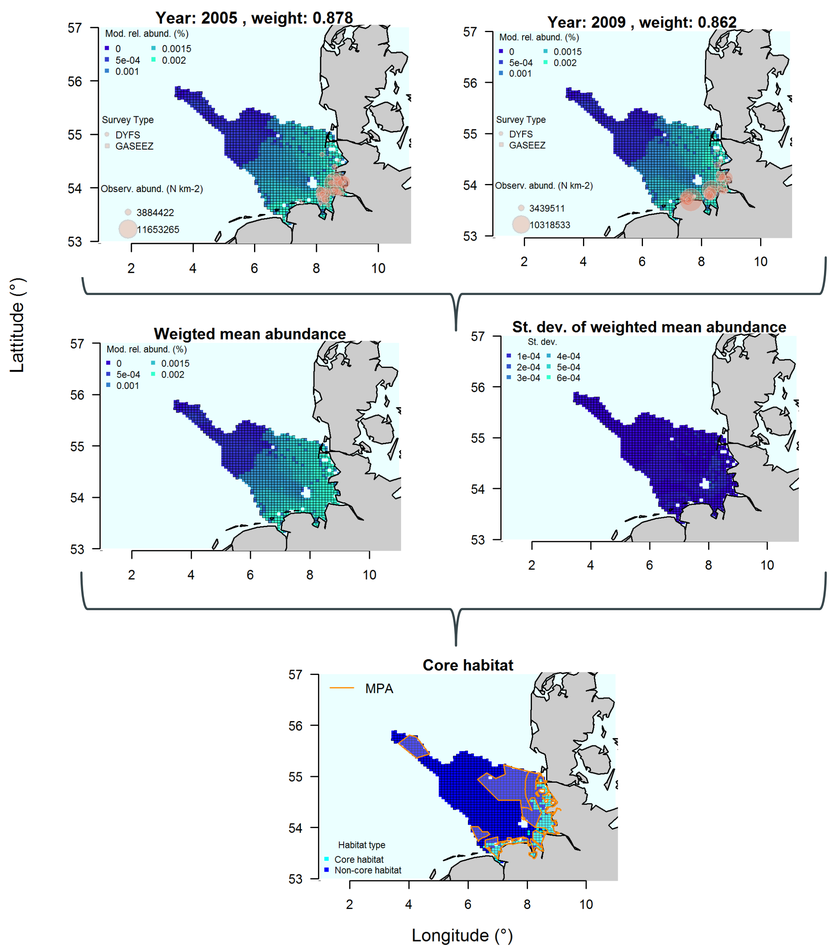

Fig. 1: Estimated distribution of brown shrimp *Crangon crangon* for 2005 and 2009 (top), resulting weighted mean abundance and standard deviation for both years (middle), core habitat for *Crangon crangon* in relation to marine protected areas (bottom).

Conclusions

- GAMS can model the **distribution** of representatively caught species well.
- Species distribution can be overlaid to identify **hotspots** for functional or taxonomic groups (i.e. decapods).
- Fisheries surveys using **beam trawls** are suitable to provide data for the distribution of epibenthic species.
- Fisheries surveys can supplement **ecosystem monitoring**.
- **Not all** hotspots of decapod occurrence fall **within MPAs**.
- Protection within MPA depend on **management regime**. Brown shrimp e.g. is a major fisheries within the German Wadden Sea national park.

Decapod diversity determined by two surveys

Creating diversity map

The core habitats (specified as areas with a weighted mean abundance above the 90%-percentile) for nine decapod species caught frequently enough to model their distribution were identified and combined into one distribution plot. The resulting overlay identified several hotspots with a maximum of three species.

The major decapod hotspot was observed along the coast of the German Wadden Sea. High decapod occurrence was also observed at the Dogger Bank and the central North of the German EEZ, while other areas did not harbour any decapod core habitats.

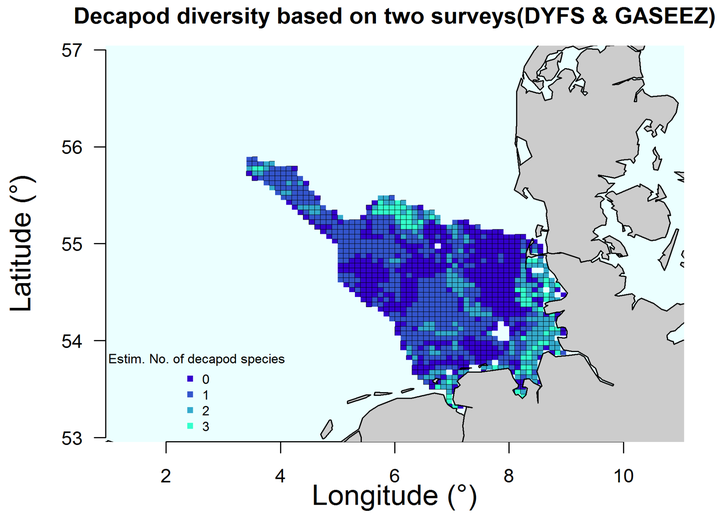

Fig. 2: Estimated distribution of decapod core habitats within the EEZ of the German North Sea, colours display the amount of species estimated from 0 to 3.

Are you interested in the diversity within the MPA's?
Pull the arrow!

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