

The impact of biological invasions on the Wadden Sea food web (INFOWEB)

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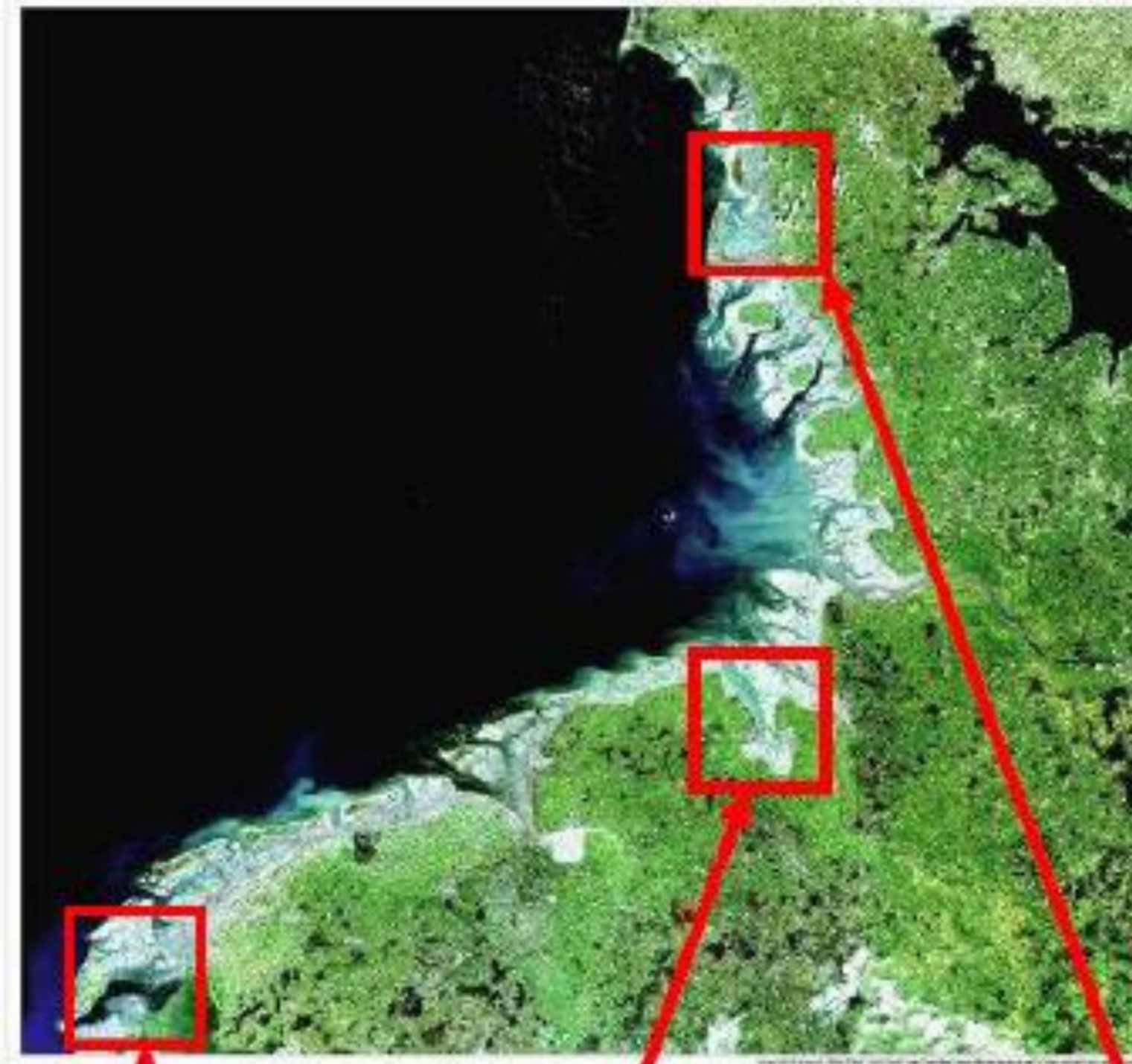
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INTRODUCTION

To assess the impact of invasive species on Wadden Sea food webs, three different areas (Balgzand, Sylt-Rømø Bight, Jade Bay) were selected to describe and compare food webs using Ecological Network Analysis (ENA). Based on dominant species occurring in different habitats (e.g. sea-grass beds, mudflats) different temporal snapshots of the three systems will be compared (i.e., when invasive species impacts were relatively low and high).



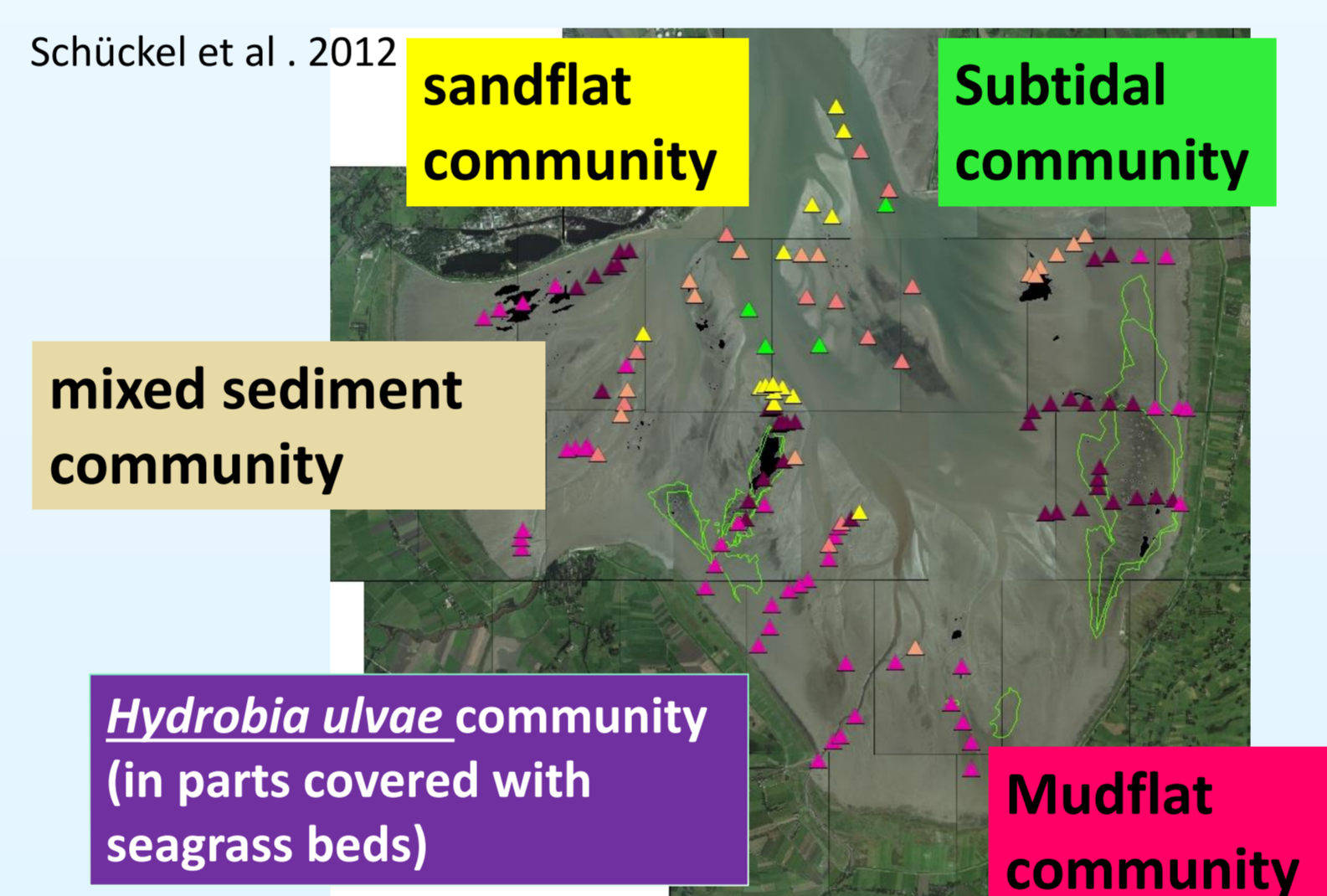
The uniformity of the symbols and indices of ENA enables us to compare our results in space and time.

We will examine if the spatiotemporal variation in environmental conditions, including a different degree of invasive species, influences the energy flow between compartments, cycles and stability characteristics.

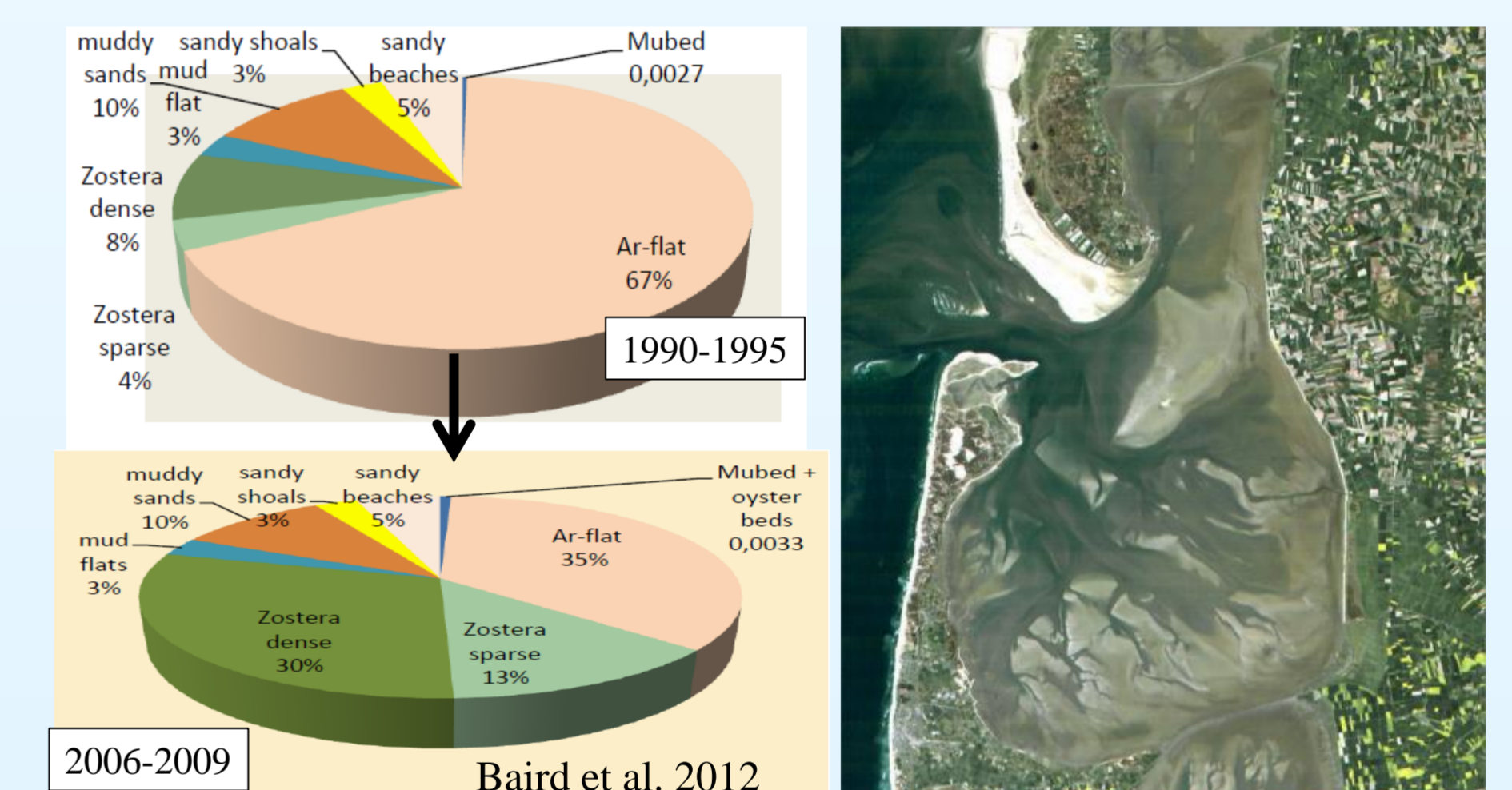
Balgzand



Jade Bay



Sylt-Rømø Bight



	mesotidal, 1.4 m	macrotidal, 3.8 m	mesotidal, 2 m
Tidal range	mesotidal, 1.4 m	macrotidal, 3.8 m	mesotidal, 2 m
Total surface area	60 km ²	158 km ²	404 km ²
Intertidal area	50 km ²	114 km ²	135 km ²
Habitat characteristics:			
Arenicola sandflats	35 %	30 %	35 %
Mudflats	15 %	43 %	3 %
Seagrass beds	<1 %	8 %	30 %
Important invasive species:	<i>Crassostrea gigas</i> (2003), <i>Ensis americanus</i> (1982), <i>Marenzelleria viridis</i> (1989), <i>Mediopyxis helysia</i> (2004), <i>Mnemiopsis leidyi</i> (2006)	<i>Crassostrea gigas</i> (1998), <i>Ensis americanus</i> (1979), <i>Caprella mutica</i> (2009)	<i>Crassostrea gigas</i> (1986), <i>Crepidula fornicata</i> (1870), <i>Ensis americanus</i> (1978), <i>Marenzelleria viridis</i> (1983), <i>Sargassum muticum</i> (1993), <i>Spartina anglica</i> (1920), <i>Mnemiopsis leidyi</i> (2006).

METHODS

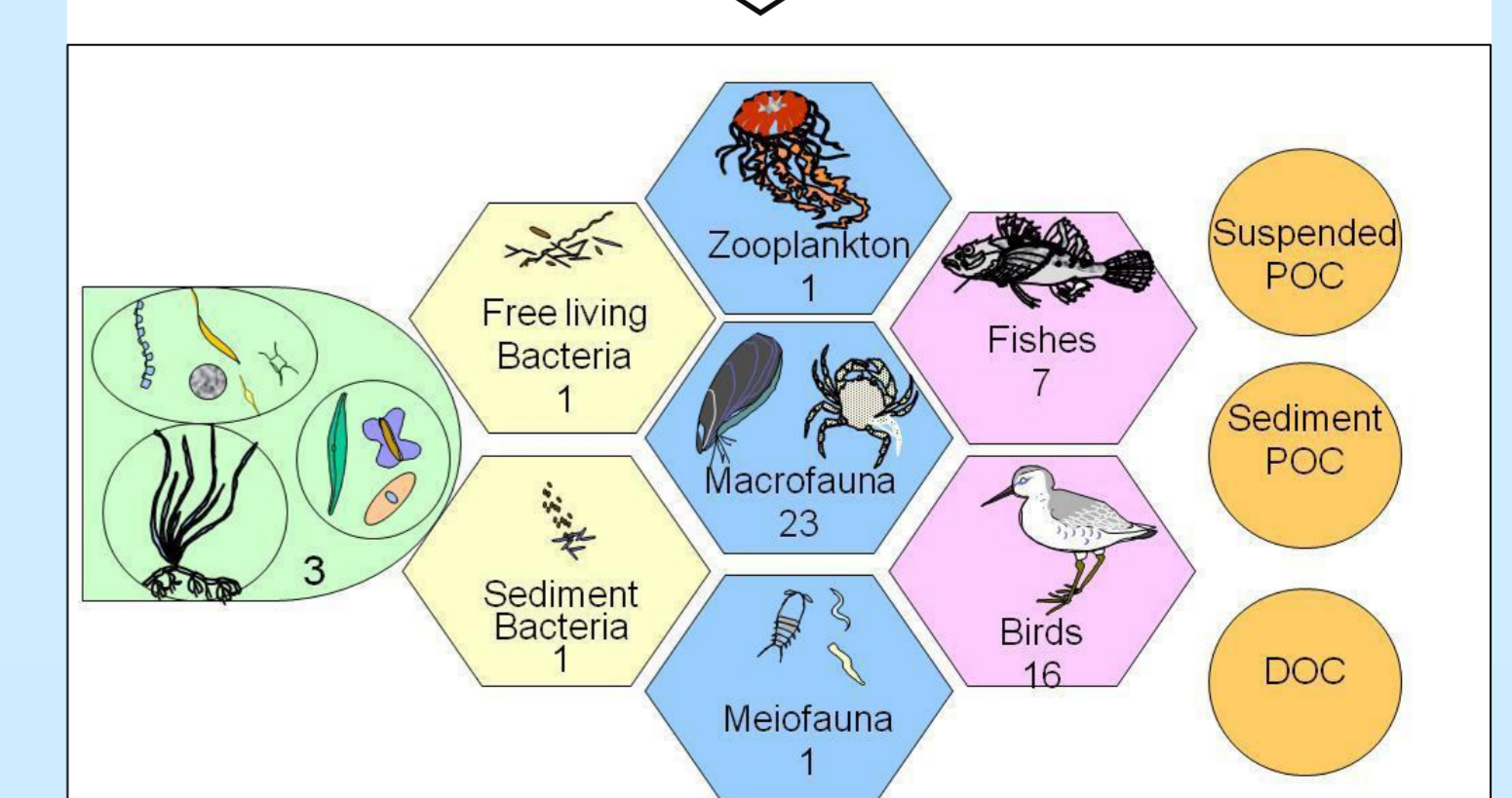
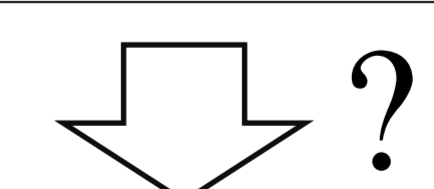
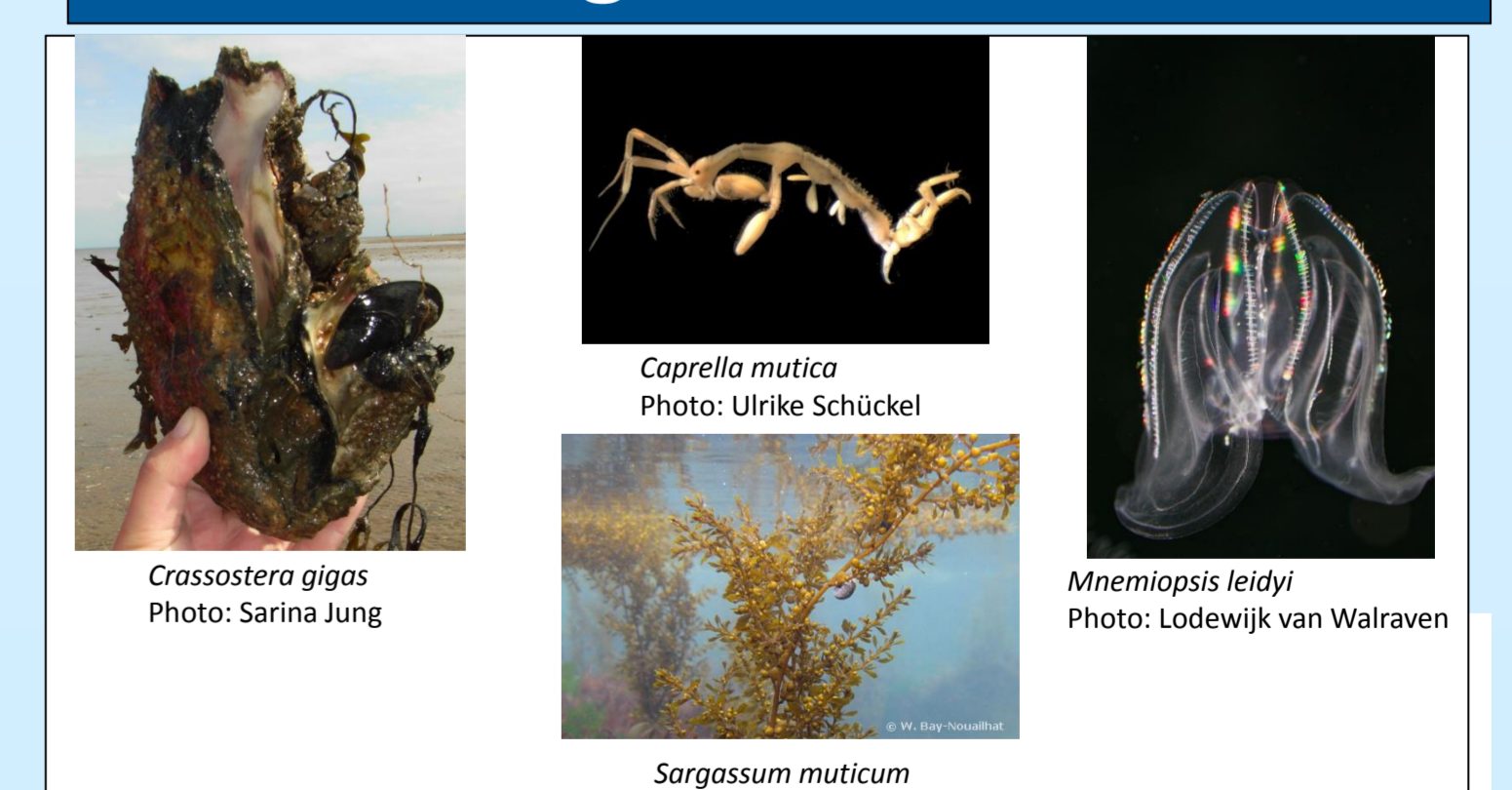
- Collecting and analyzing long-term field observations on all major food web compartments (from bacteria to mammals)
- Estimation of diet composition among higher trophic level by means of stable isotopes and stomach content analysis
- Using Dynamic Energy Budget (DEB) analyses for estimation of missing values of respiration, egestion and consumption
- Building up ENA Models for different temporal snapshots to estimate the influence of invasions

LITERATURE

Baird D., Asmus H., Asmus R. (2012) Effect of invasive species on the structure and function of the Sylt Rømø Bight ecosystem, northern Wadden Sea, over three time periods MARINE ECOLOGY PROGRESS SERIES. Vol. 462: 143–162, 2012 DOI: 10.3354/meps09837

Schückel, U, Beck M, Kröncke I (2012) Spatial variability in structural and functional aspects of macrofauna communities and their environmental parameters in the Jade bay (Wadden Sea Lower Saxony, southern North Sea. Helgoland Marine Research, in press. DOI 10.1007/s10152-012-0309-0

Biological Invasions



Food web