

Evaluating the effects of man-made structures on the functioning of the benthic system in the North Sea

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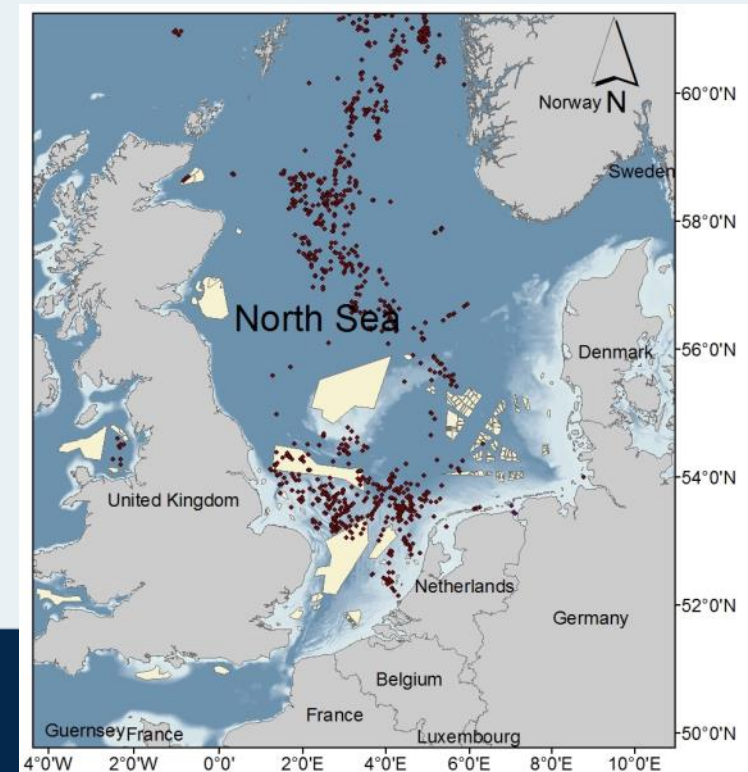
Introduction: Context

- Fundamental community differences between hard substrates and soft sediments;
- Rapid expansion of man-made structures (MMS) in the North Sea → offshore wind farms & oil and gas platforms;
- Understand the magnitude of structural and functional changes induced by the introduction and decommissioning of MMS in the marine system.

Hard substrate

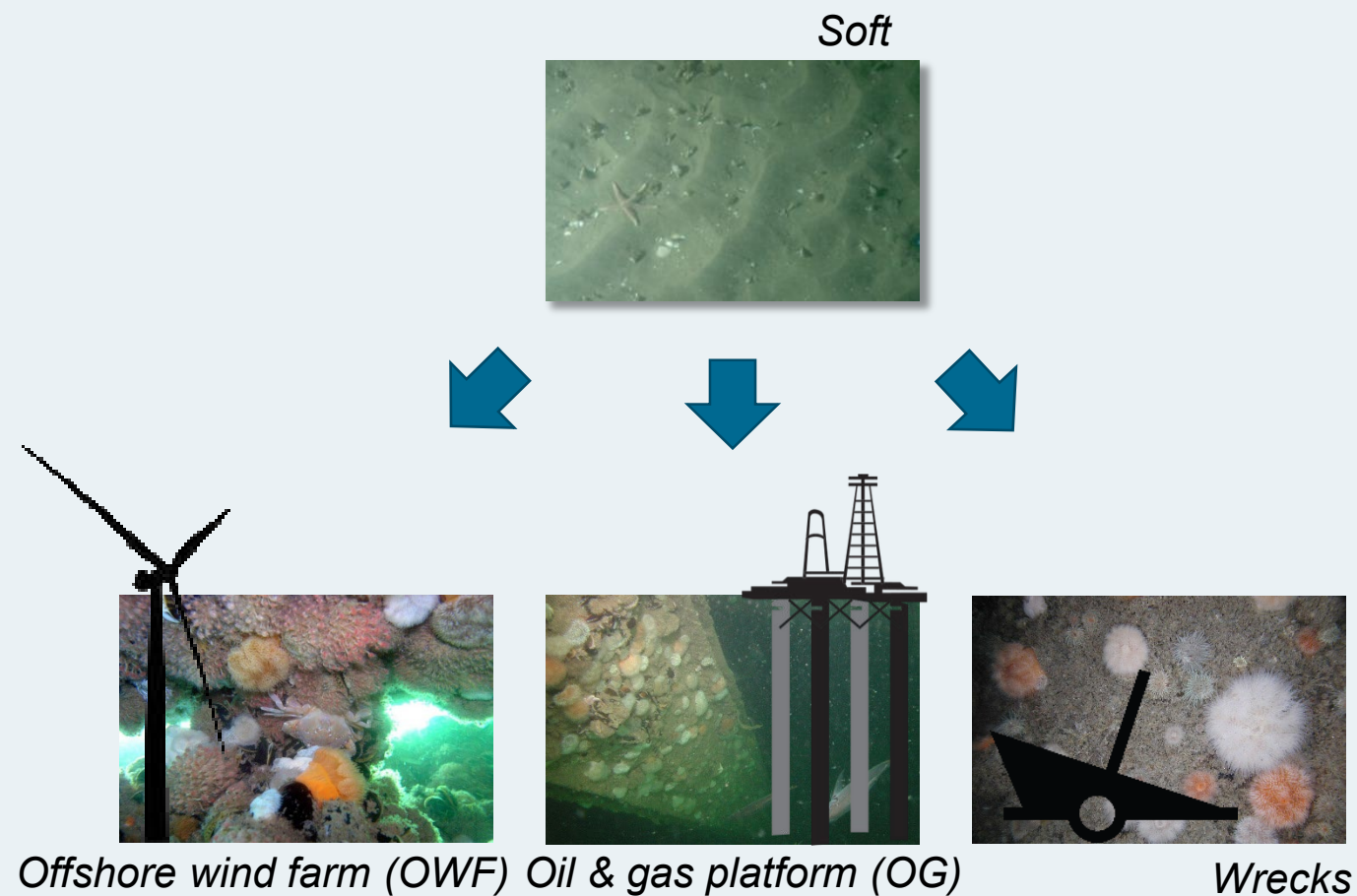


Soft bottom



Introduction: UNDINE

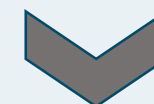
(Understanding the Influence of man-made structures on the Ecosystem functions of the North Sea)



Structure
(community composition)



Functional proxies
(biological traits)



Processes & function
(secondary production)



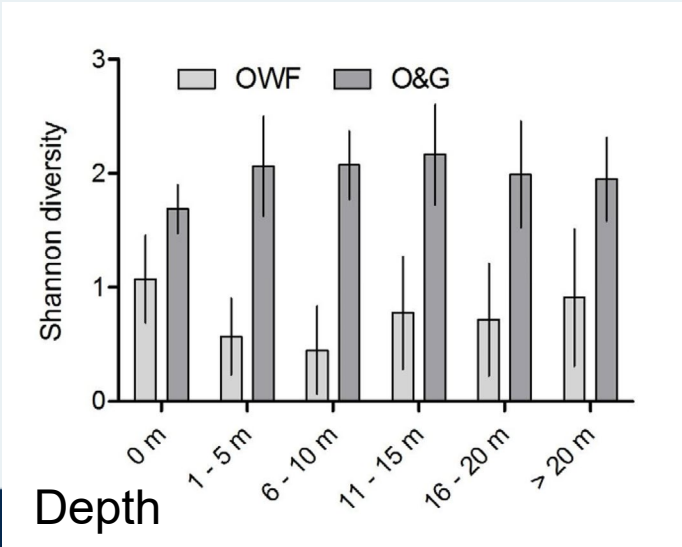
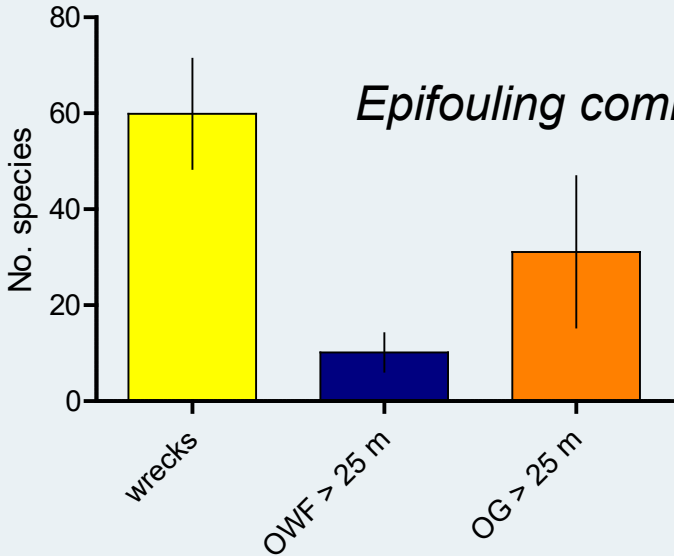
Structure - biodiversity

North Sea infauna

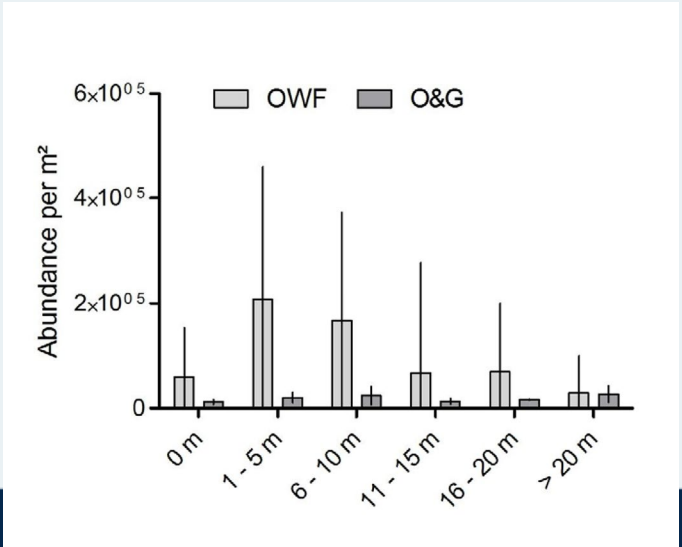
~50 species

MMS

Epifaunal community



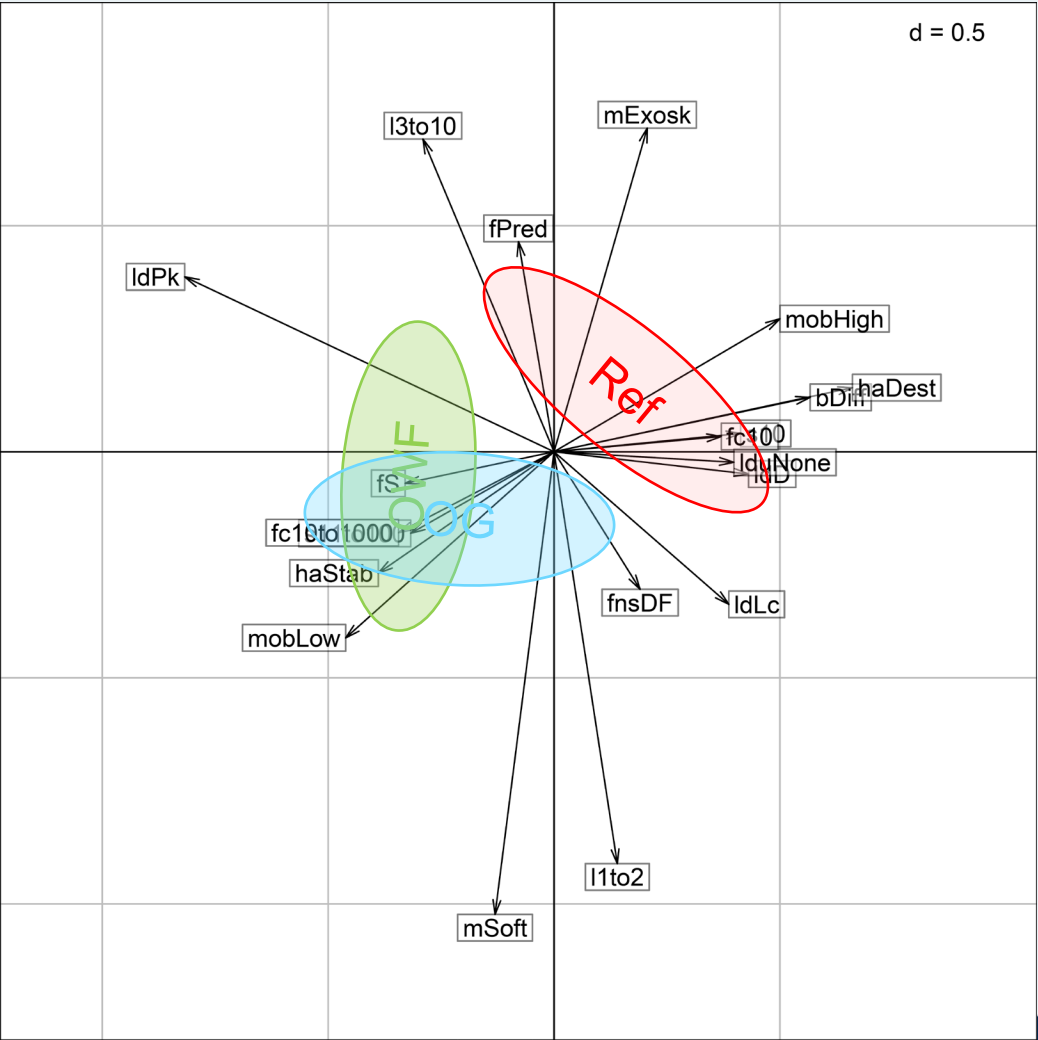
Shannon:
OWF <
OG



Abundance:
OWF > OG



Functional proxy: Biological traits

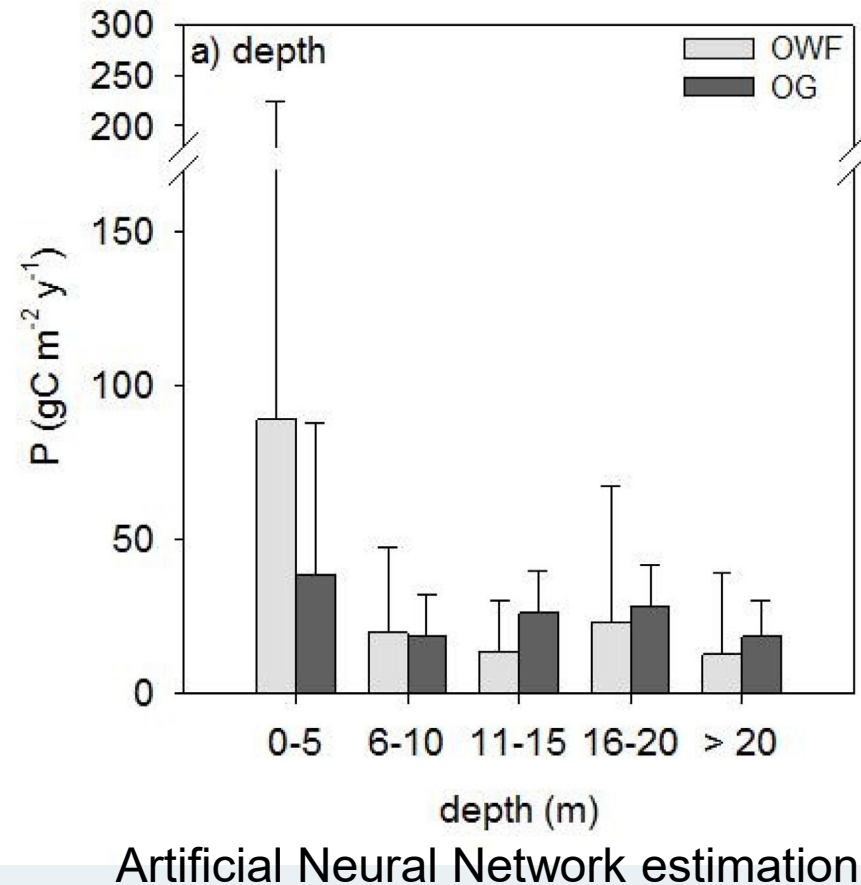
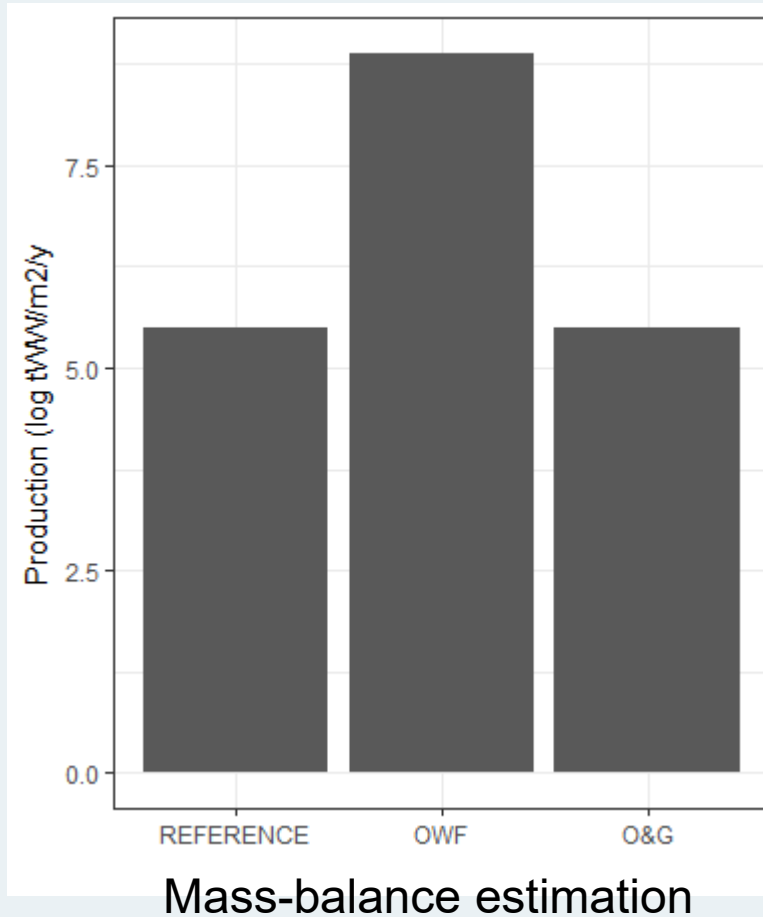


- Difference between soft sediment and MMS;
- Similar trait response from structure;
- No or marginal differences between OWF & OG.

Traits	Function
Habitat stabiliser Habitat creator	Habitat/Species diversity
Planktotrophic Fecundity	Dispersal - Connectivity Recovery - Resilience
Filter feeder Biodeposition	OM supply Mineralisation – C recycling
Low mobility Soft body (?)	Food supply



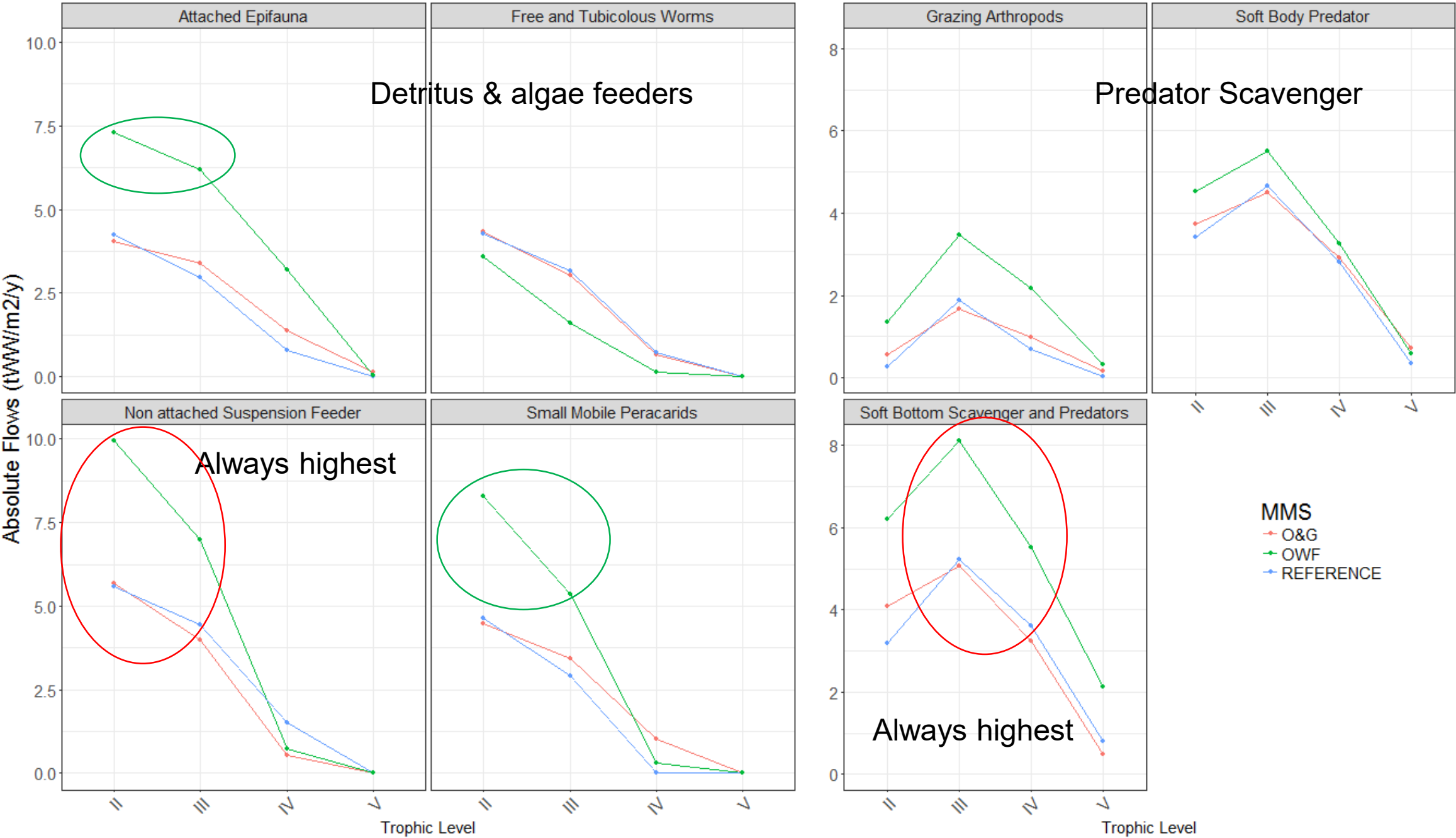
Ecological process – Secondary production



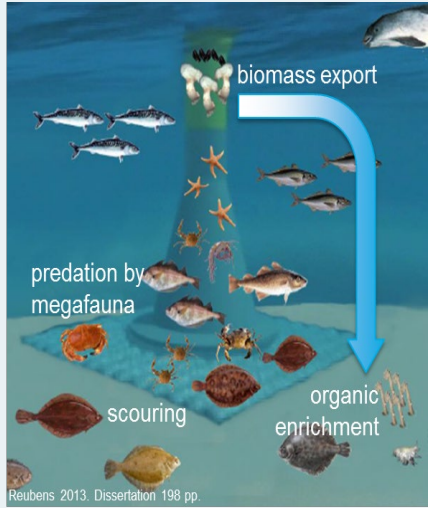
- Consistent between methods
- Soft ~ OG < OWF
- Only for shallow depths



Ecological process – Trophic flows



Summary



- Biodiversity: Addition of niche space by MMS inducing more species not initially present;
- Functional proxies: trait response similar across MMS suggesting the promotion of some functions compared to reference values;
- Carbon/Energy flow: higher production and energy flow for OWF when no striking difference was found between reference and OG.



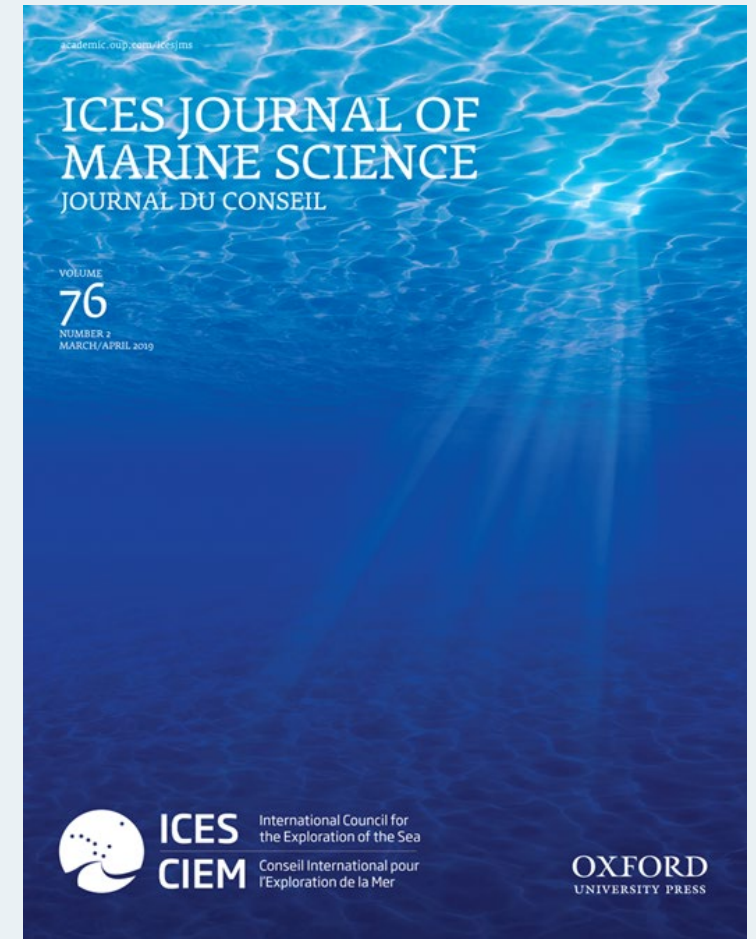
Future perspective

- Knowledge gaps
 - Better integration of temporal dimension (ecological succession);
 - Addition of spatial data covering the north North Sea for better extrapolation;
 - Estimating ecological process (measure of production);
 - Expand the understanding of functions (e.g. carbon cycle).
- Relevance of outputs
 - Expand current geographical score (e.g. tool box).
 - Advise on cost effective surveys;
- Further knowledge
 - Sustainable management of marine natural capital;
 - Scientific support for decision-making (e.g. decommissioning);
 - Implication in the biodiversity and ecosystem functioning scope;
 - Key ecosystem process supporting marine ecosystem services.



ICES Journal of Marine Science

- "Science in support of ecologically sound decommissioning strategies for offshore man-made structures"
- Last year launched two invitations
- A total of 30 submissions
- A total of 15 papers accepted
- Waiting for 2 more contributions
- **Publication in January 2020**
- Editorial: Silvana Birchenough (Cefas) and Steven Degraer (RBINS)



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Thank you for your attention!



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