# Changes in benthos at alpha ventus

– lessons learnt from monitoring evaluation –

Jennifer Dannheim, Lars Gutow, Katharina Teschke, Jan Holstein, Andreas Schmidt, Roland Krone, Manuela Gusky

aims of StUKplus project

- evaluation of the German standard for environmental impact assessment (StUK3)

- wind farm effects at different spatial scales: turbine - wind farm – region

- cumulative effects, natural temporal/spatial variability of benthos
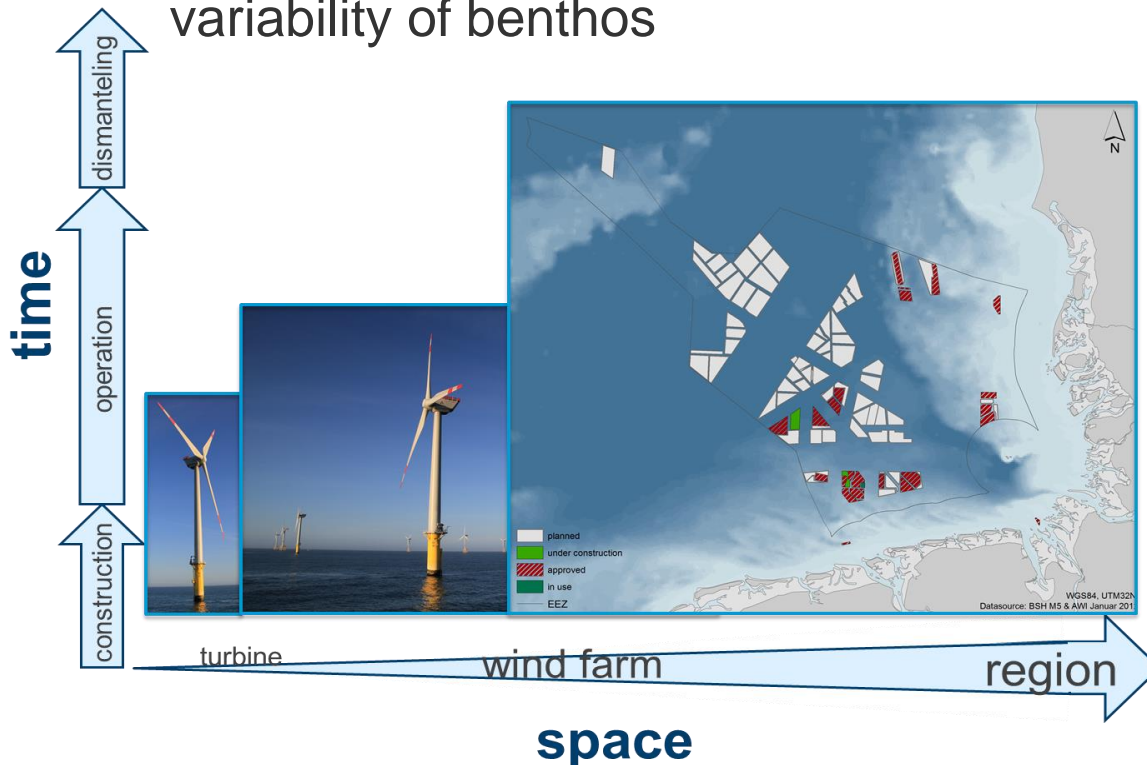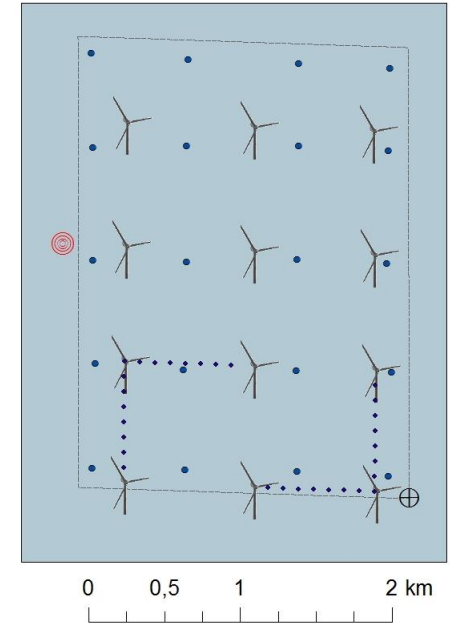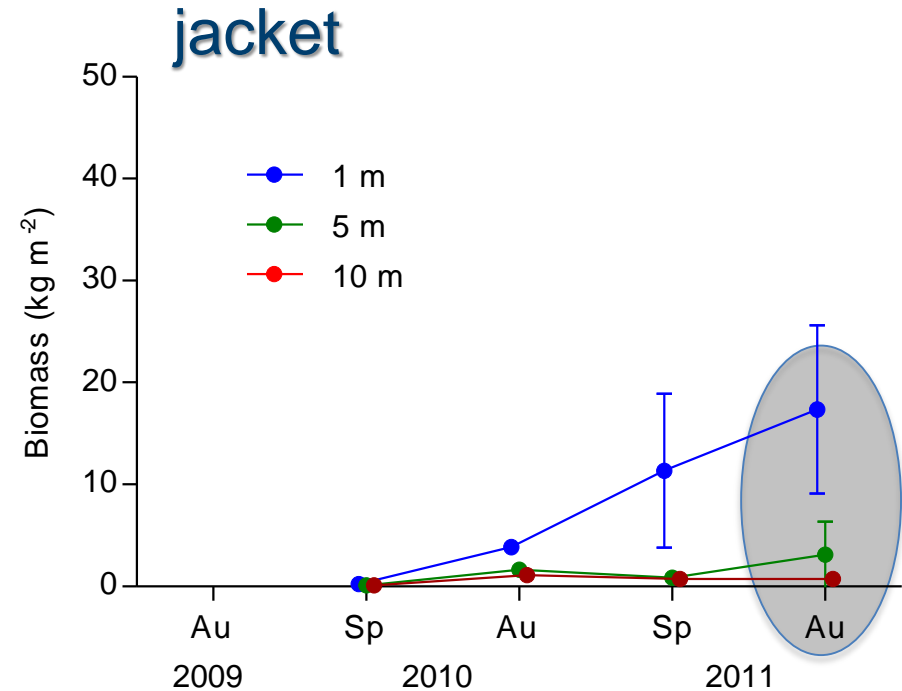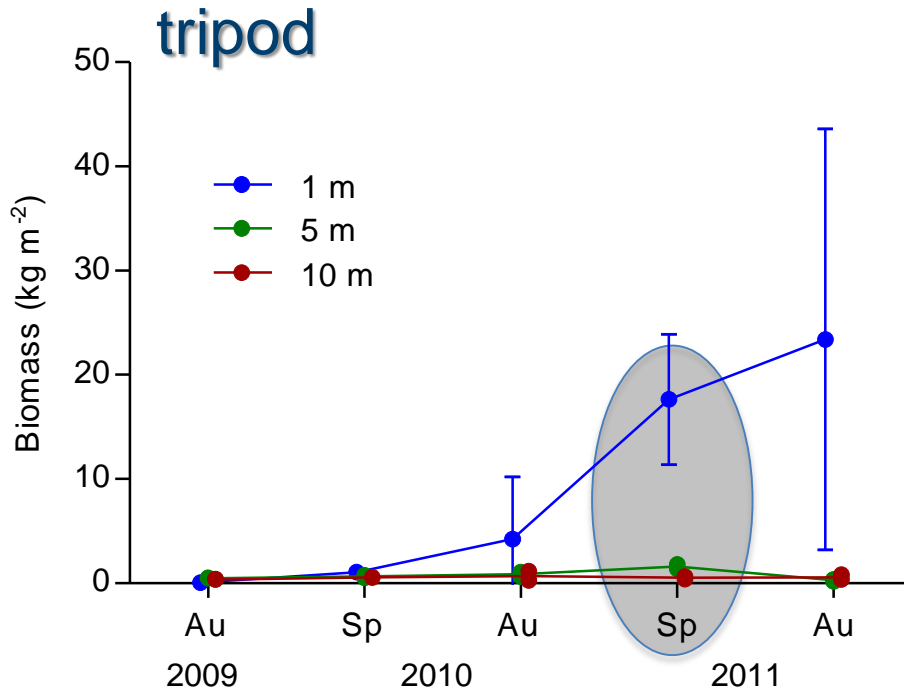

evaluation criteria for sensitive areas

→ permit procedures

→ marine spatial planning

turbine focus - epifouling

tripod / jacket biomass charts with *Mytilus edulis* photo and mussel illustration.
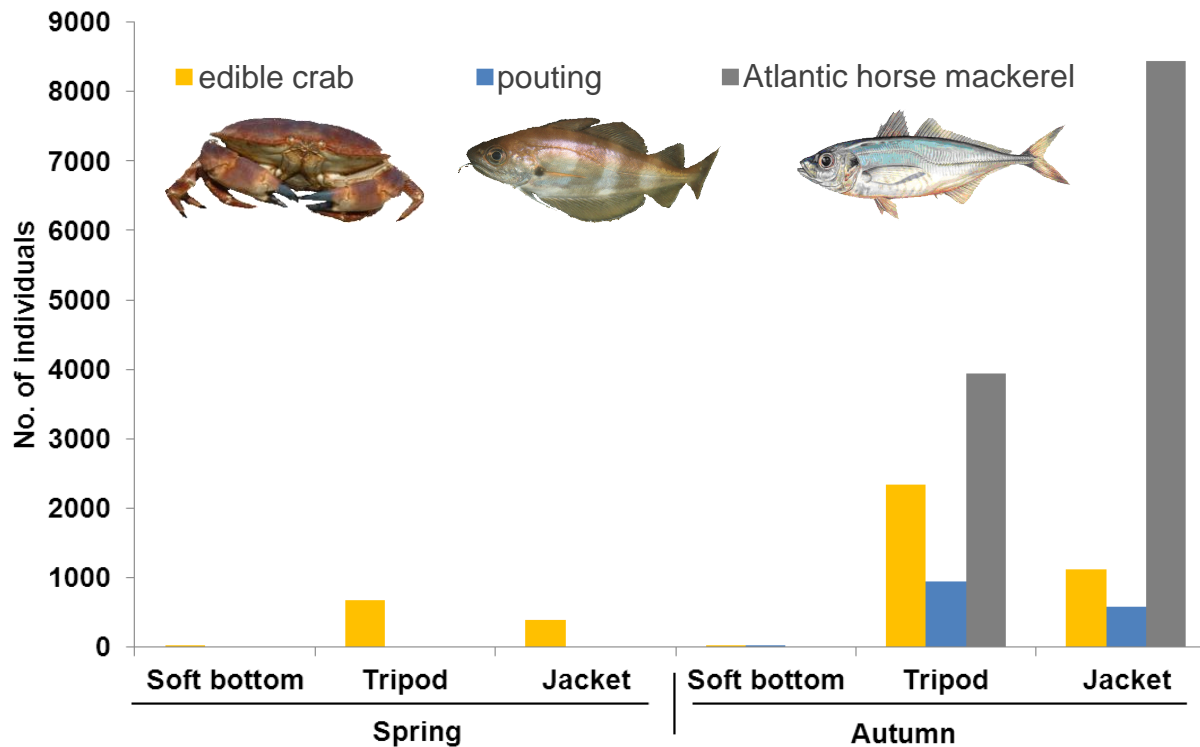
Mytilus edulis

biomass contribution
1 m	96 %
5 m	21 %
10 m	5 %

turbine focus - megafauna

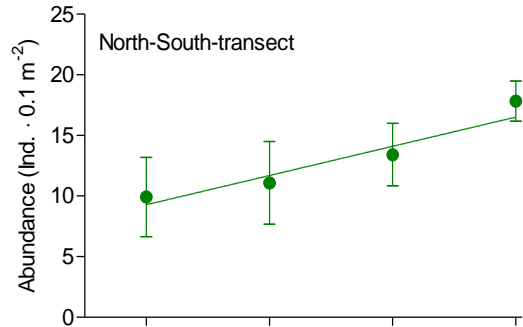## second year after construction

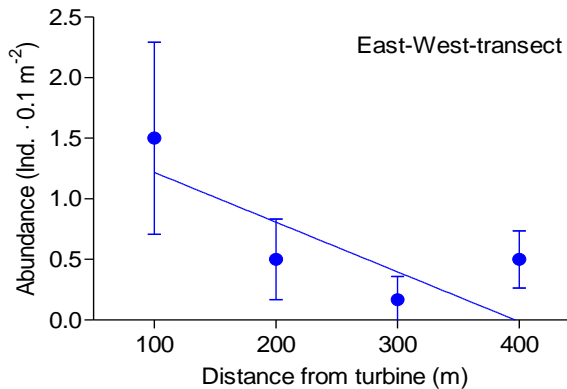standing stock in alpha ventus ~20,700 edible crabs

turbine ←→ wind farm focus

species

≥80% occurence frequency: 19 species
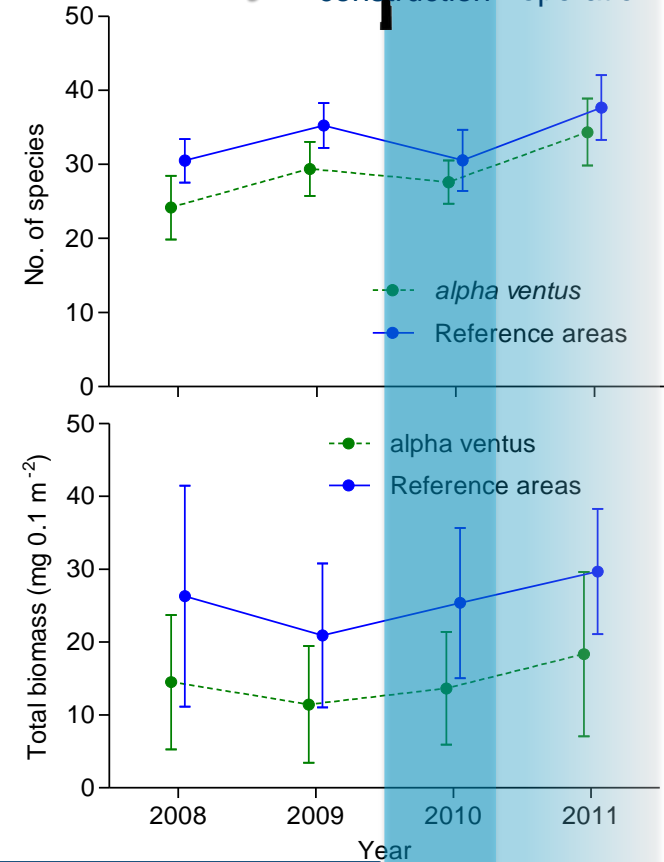

Bathyporeia guilliamsoniana

$R^2 = 0.47$
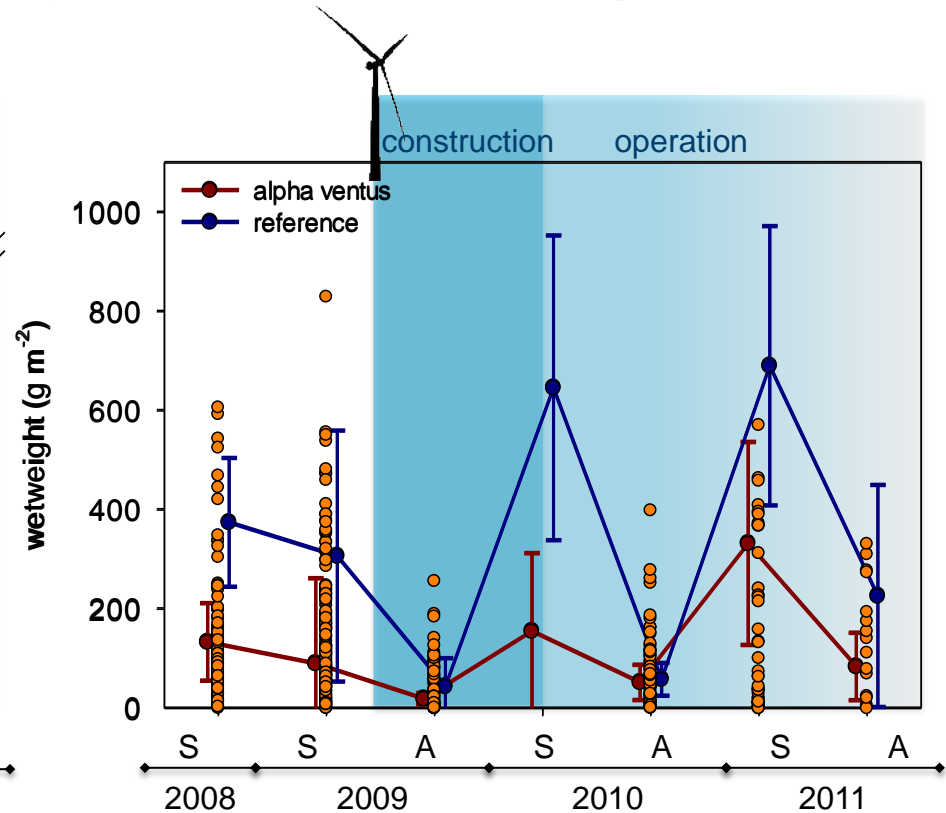$P = 0.01$

Thracia phaseolina

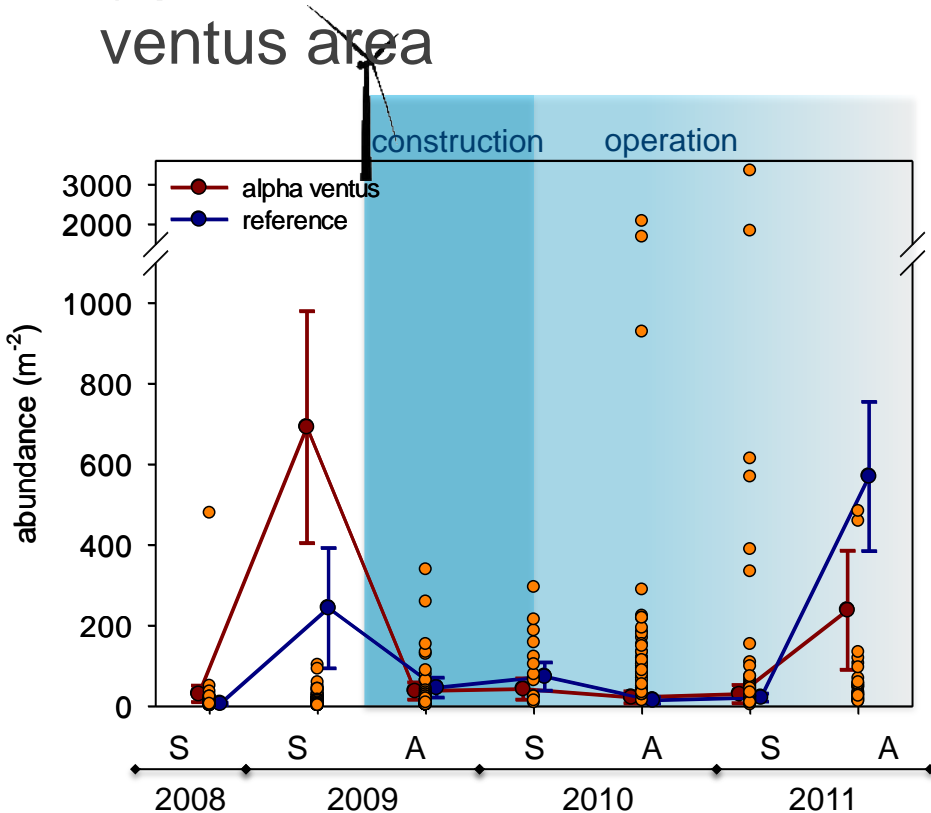$R^2 = 0.40$
$P = 0.02$

community

construction   operation

→ Small wind farm → edge effects?

→ Time frame → „slow" benthic system

→ Spatial resolution → local effects (<100 m)

wind farm focus

different temporal development of all community descriptors (species, biomass, abundance) in reference and alpha ventus area
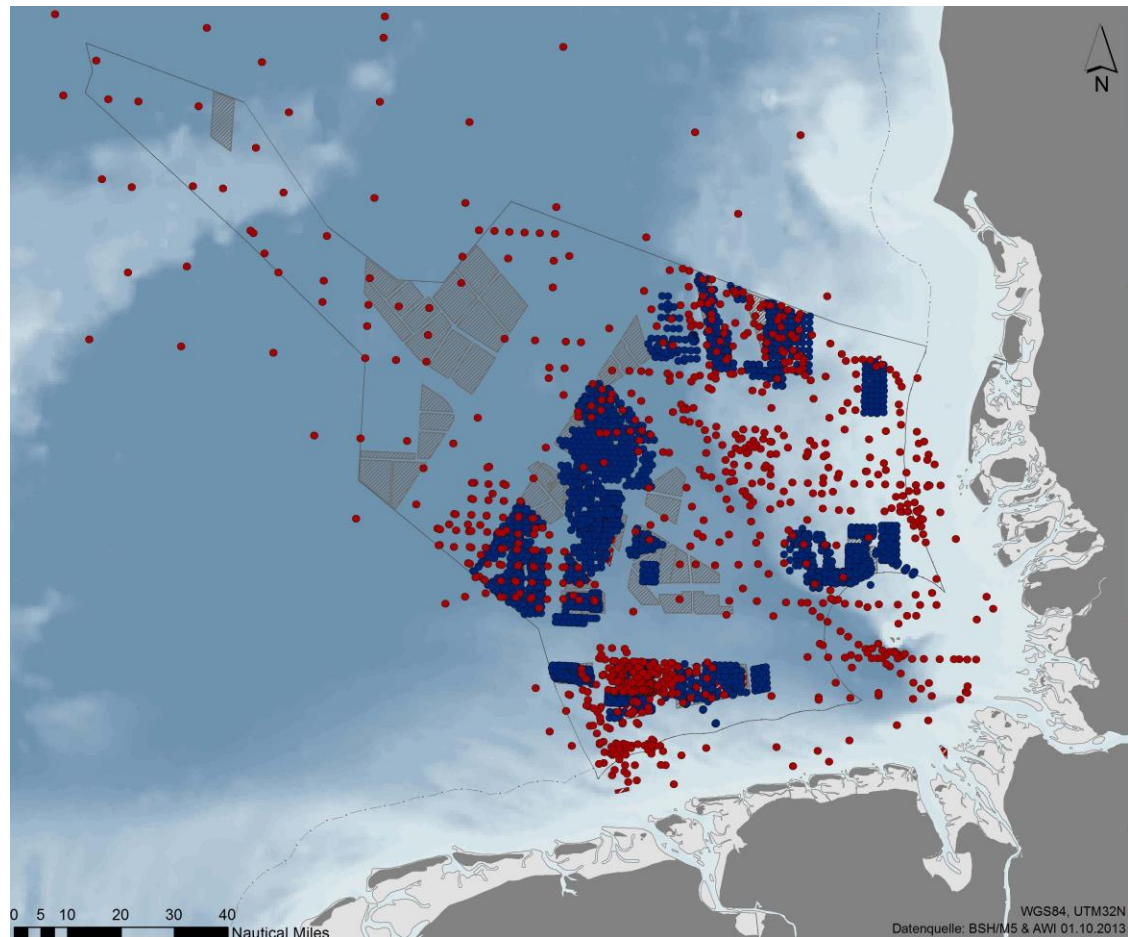

Spiophanes bombyx

Echinocardium cordatum

regional focus - database

- database on benthic invertebrates and demersal fish
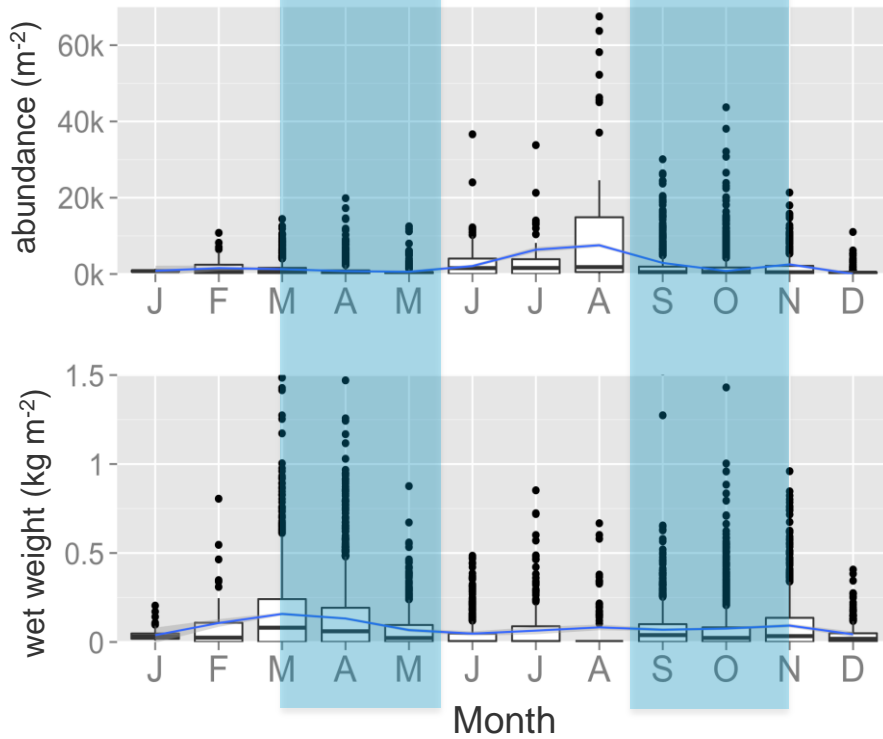
- relational database system

Benthic database

- van Veen grabs, beam trawls

- > 2100 station entries from research projects, > 7000 from EIA

- > 200 000 taxa entries with biomass and abundance

regional: temporal/spatial variability
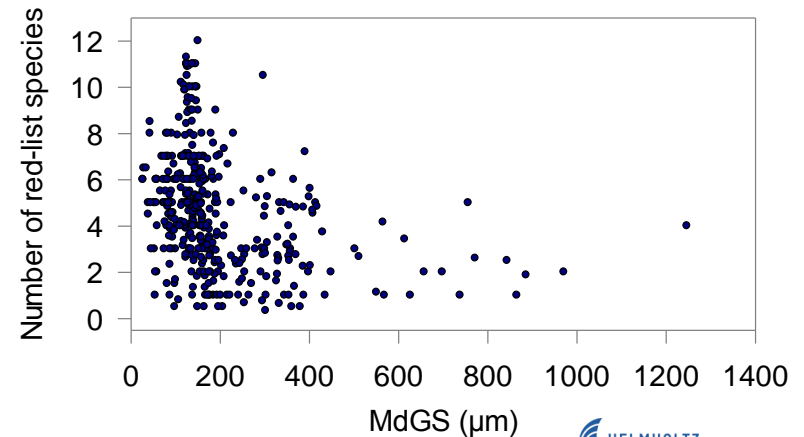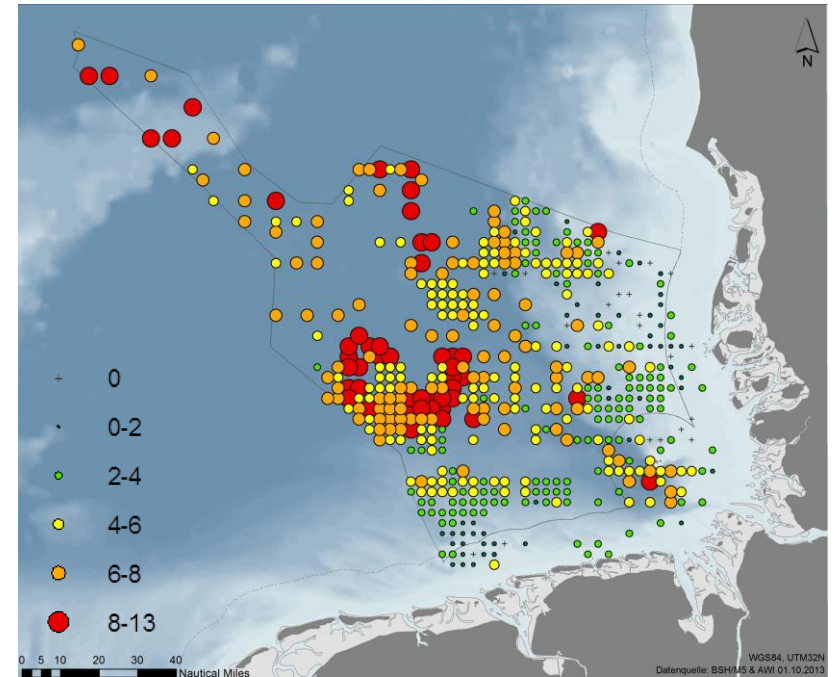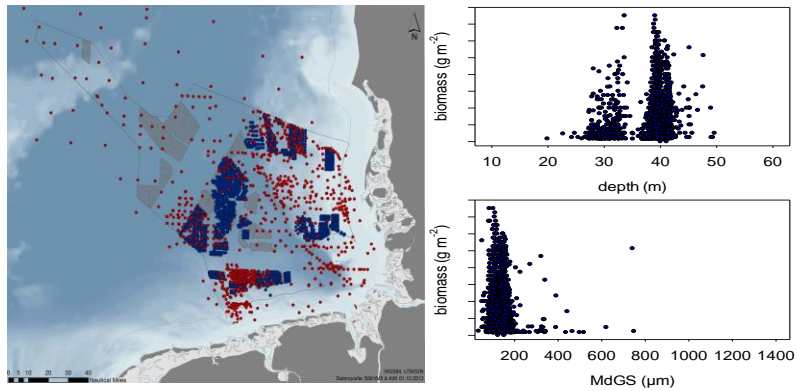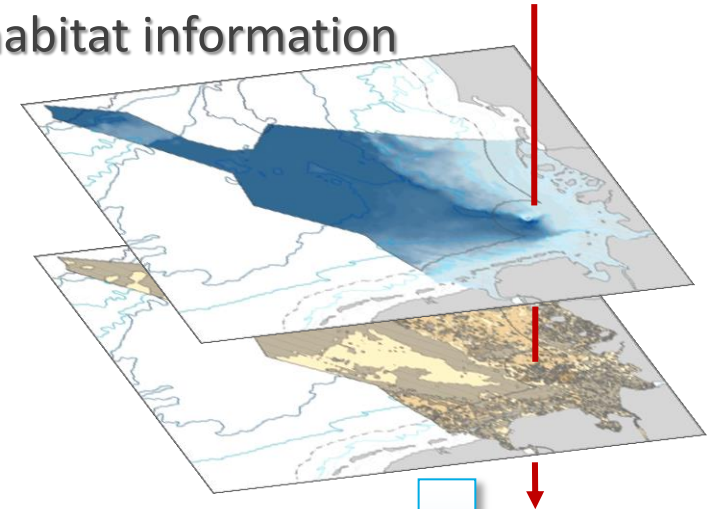

StUK sampling periods

density ⬇ biomass ⬆

regional: spatial modelling

species information

habitat information

Callianassa sp.

random forest
model

quality:
AUC: 0.92
R_S: 0.68

error:
253 mg m^{-2}

2588 mg/m²

250 mg/m²
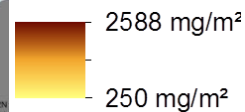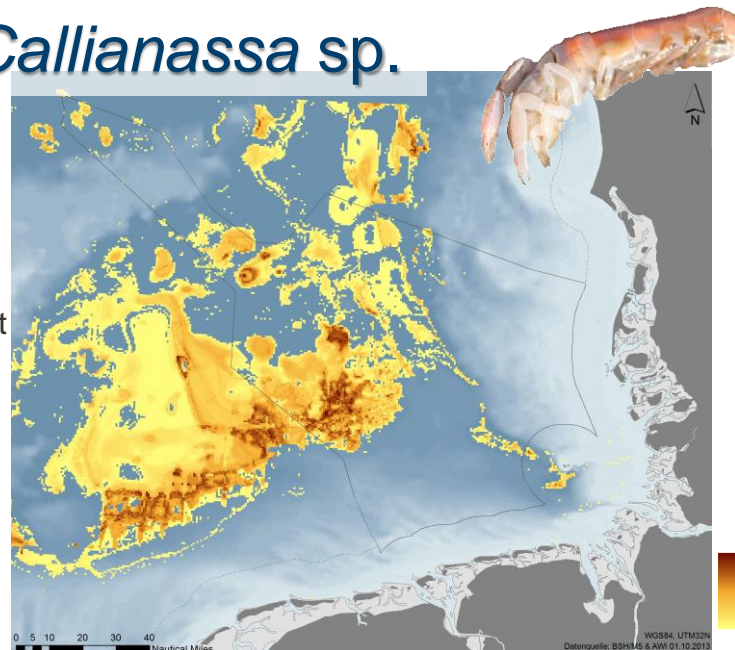
outlook – lessons learnt

Monitoring evaluation – StUK 4

extension

- mobile megafauna at turbines

- installation-based infauna sampling (50, 75, 100 m)

- benthic monitoring for installation of cable routes

reduction

- no benthic monitoring in construction phase

- no seasonal monitoring cycle, reduced to autumn

- cluster study, share of reference areas for BACI

www.bsh.de/en/Products/
Books/Standard

outlook – where to go

turbine focus

- cause-effect relationships of specific questions, hypotheses based research

wind-farm focus

- most striking things to come: fishery cessation!

regional focus

- service-oriented long-term open data service

    decision basis for stakeholders

- Scientific analysis on regional to international scale

    model processes, marine ecosystem services & goods

WGMBRED

SSGEF

Chair: Andrew Gill, Jennifer Dannheim

Working Group on Marine Benthal and Renewable Energy Developments

> **Read more**

Alfred Wegener Institute
Helmholtz Centre for Polar and Marine Research

Dr. Jennifer Dannheim
Functional Ecology

Am Handelshafen 12
27570 Bremerhaven
Germany
phone   +49 471 4831 1734
fax   +49 471 4831 1425
email Jennifer.Dannheim@awi.de
www.awi.de

Thank you

BSH

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Bundesministerium für Verkehr, Bau und Stadtentwicklung

PtJ
Projektträger Jülich
Forschungszentrum Jülich

Gefördert durch:

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit

HELMHOLTZ
| GEMEINSCHAFT

aufgrund eines Beschlusses
des Deutschen Bundestages