Fish and benthos at alpha ventus

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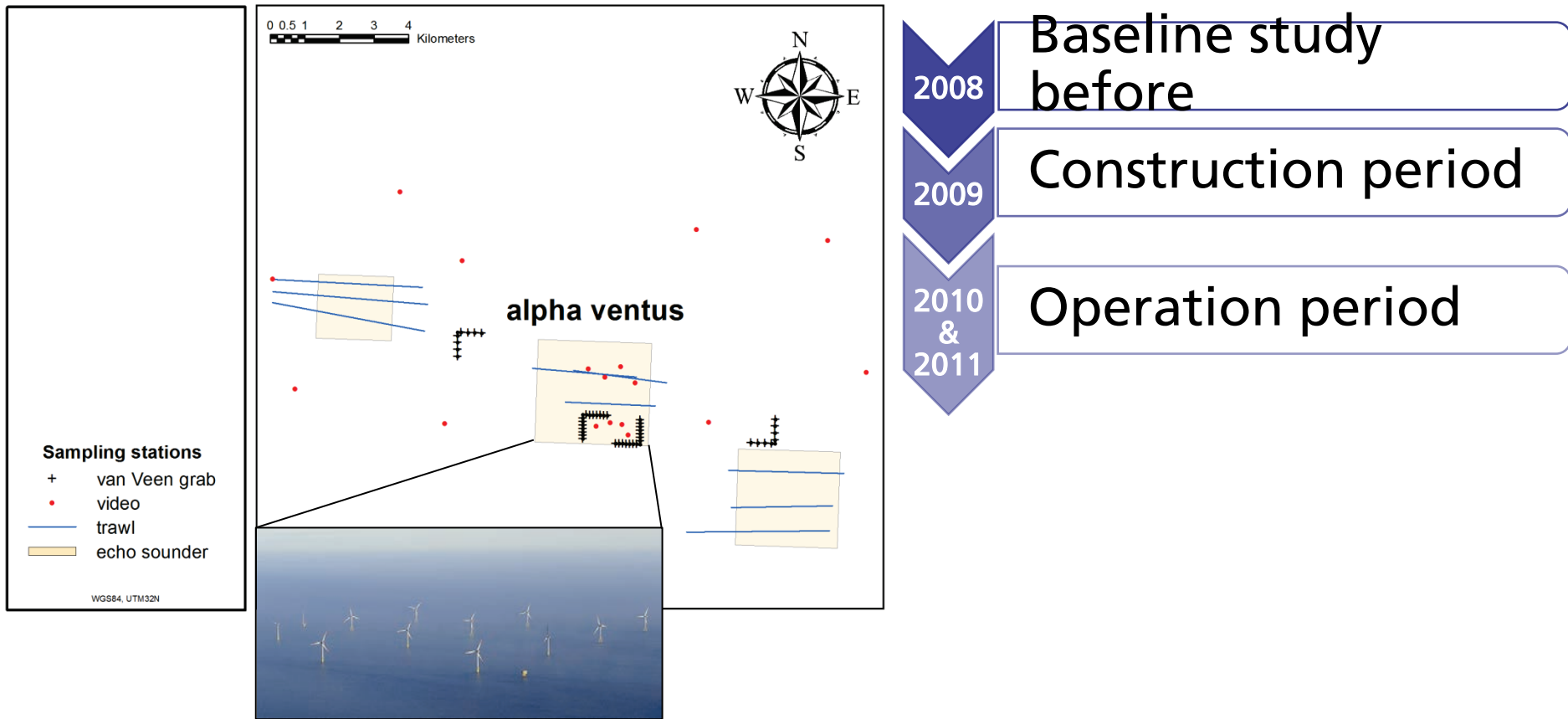Alfred Wegener Institute for Polar- and Marine Research (AWI)

Bremerhaven, 8 May 2012

Sampling design - **Fish** & **benthos**

2008 → Baseline study before

2009 → Construction period

2010 & 2011 → Operation period

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Hydroacoustic survey on **pelagic fish**
- Construction period -

Single Target detections ping^{-1} [38 kHz, treshold: –60 dB]
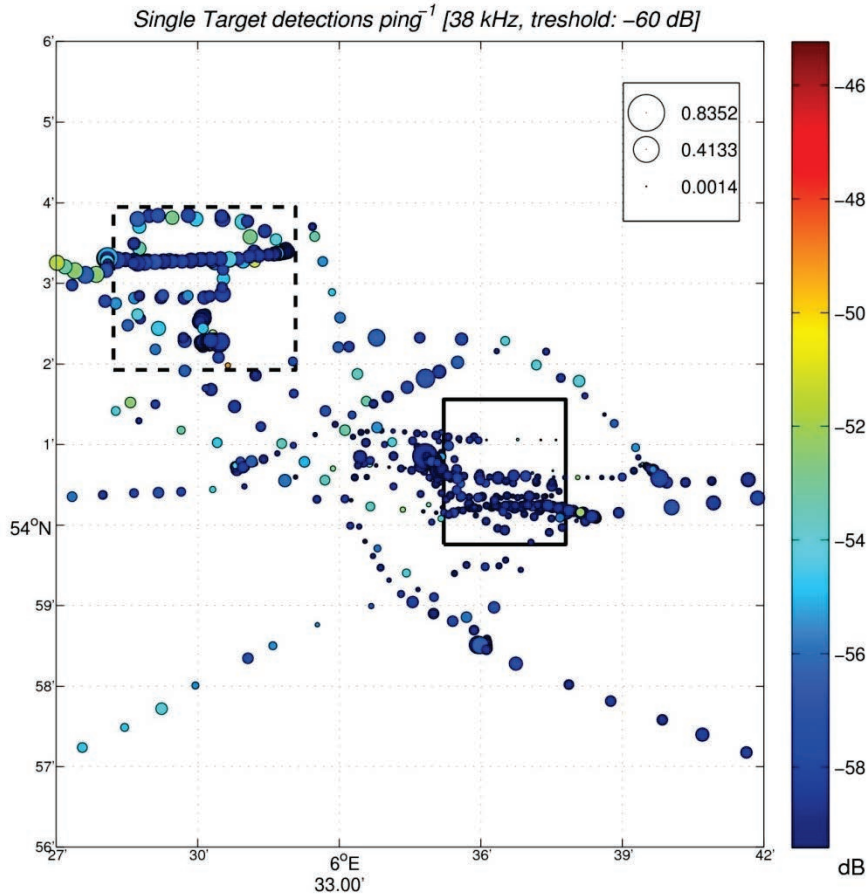
Area	single target detection ping^{-1} mean ± SD (median)
Alpha ventus	0.040 ± 0.024 (0.039)
Reference	0.112 ± 0.035 (0.113)
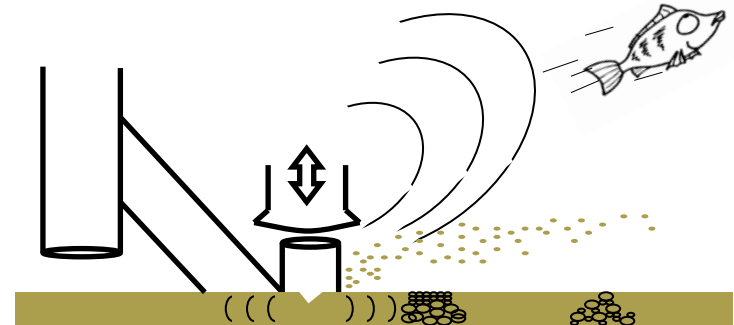
➤ Scare off effects
➤ Patchy distribution patterns

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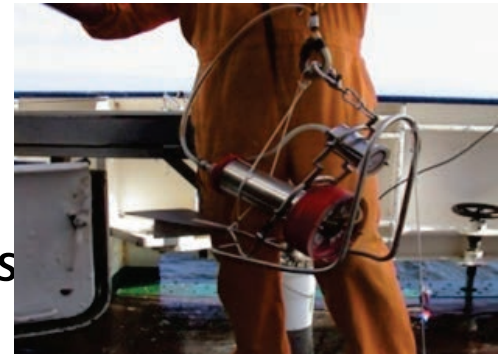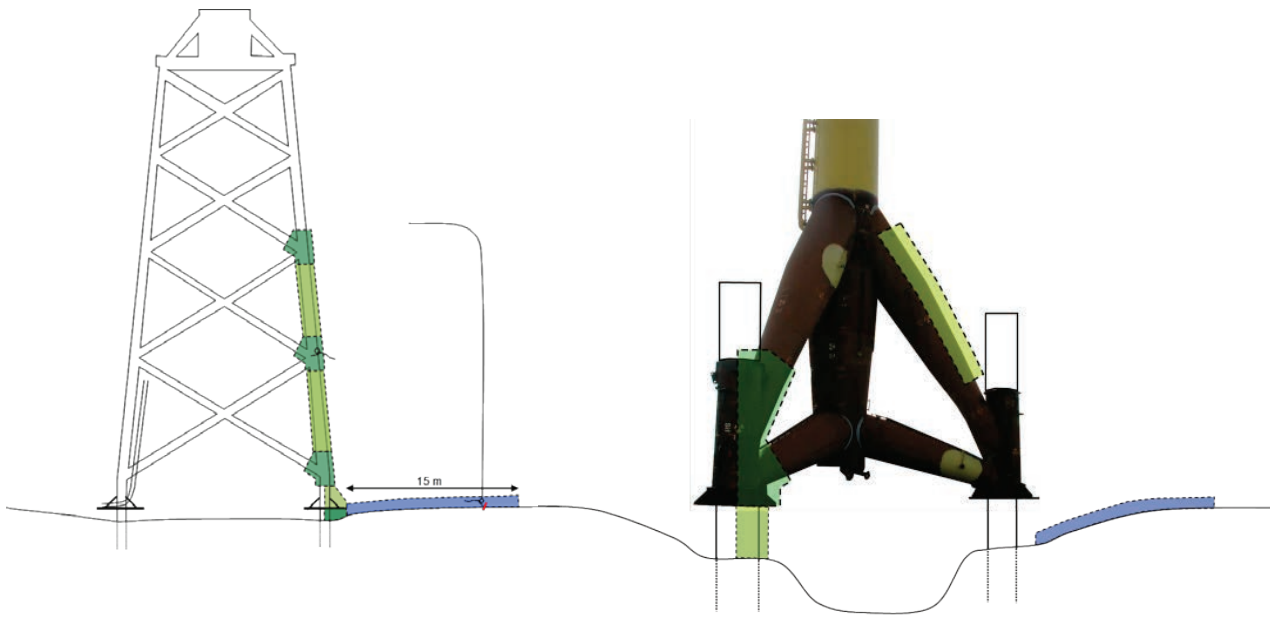# Video & fishing survey on **pelagic fish**
- Operation period -

➢ Local aggregations of horse mackerel at FINO 1

➢ Snapshots
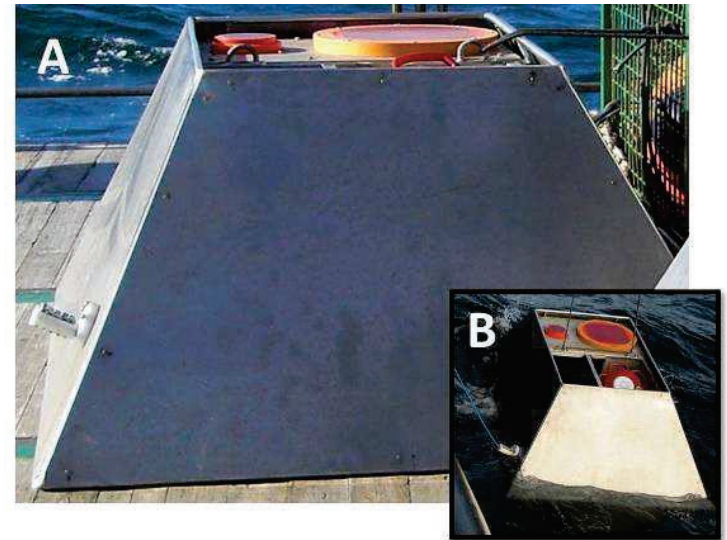
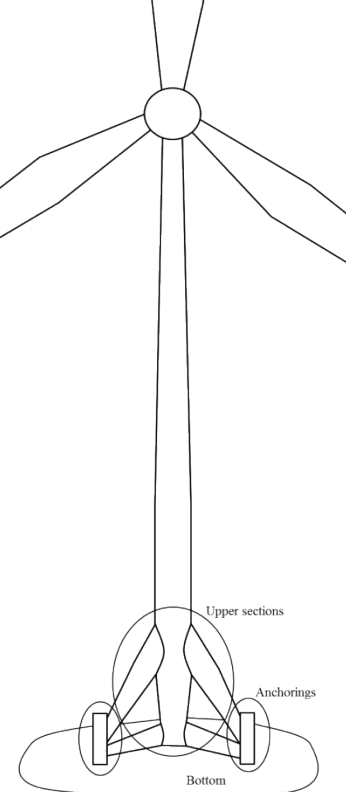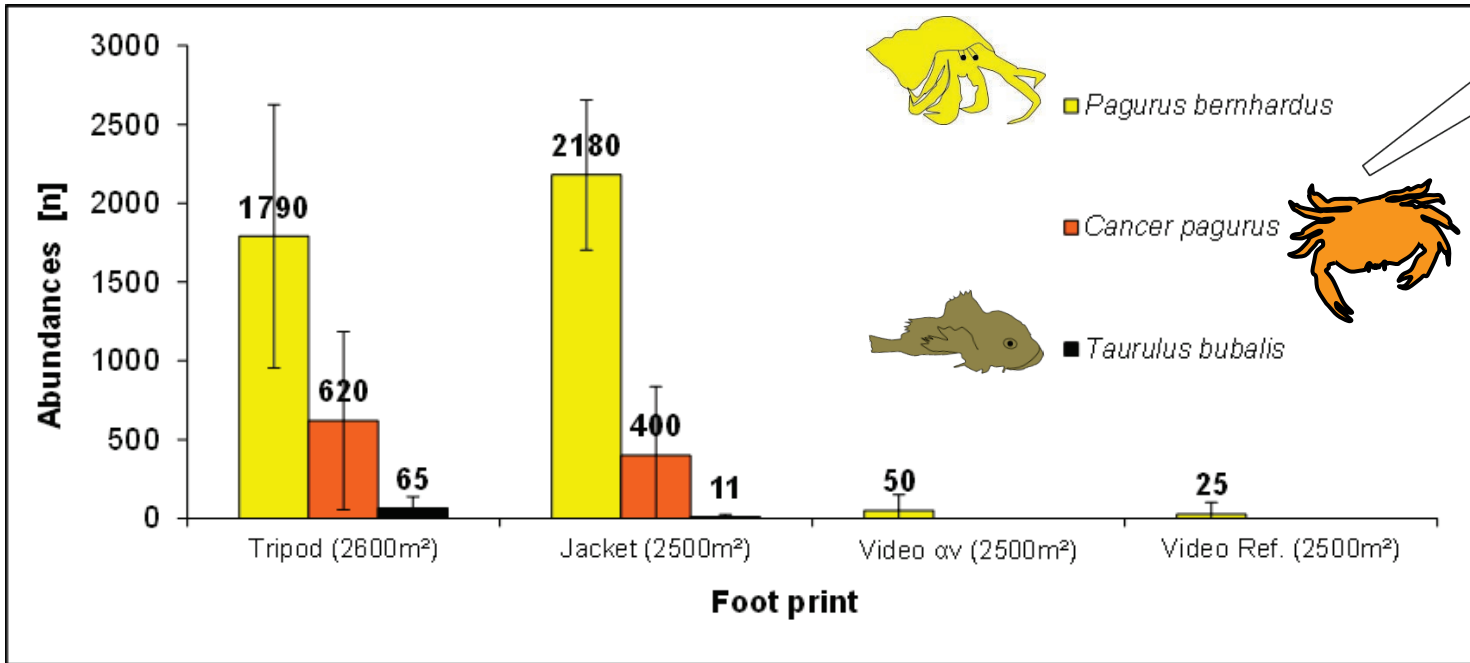➢ Stationary hydroacoustic measuring system

Video and diving on **demersal fish & crab**

- ➢ Diving transects at "Jacket" & "Tripod" foundations
- ➢ Video surveys at open areas

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RESEARCH AT ALPHA VENTUS
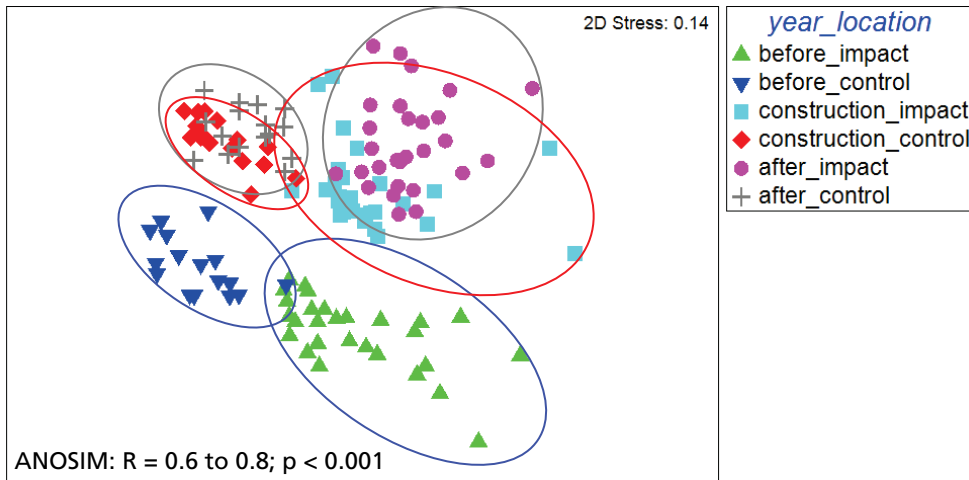Eine Forschungsinitiative des Bundesumweltministeriums

Video and diving on **demersal fish & crab**

- ➤ High abundances of fish and crab at wind turbine foundations relative to open areas

- ➤ No difference between "Tripod" & "Jacket"

Survey on **benthic invertebrates**

2D Stress: 0.14

year_location
- ▲ before_impact
- ▼ before_control
- ■ construction_impact
- ◆ construction_control
- ● after_impact
- + after_control

ANOSIM: R = 0.6 to 0.8; p < 0.001

2D Stress: 0.14 *Nemertea*
- • 2
- • 8
- • 14
- • 20

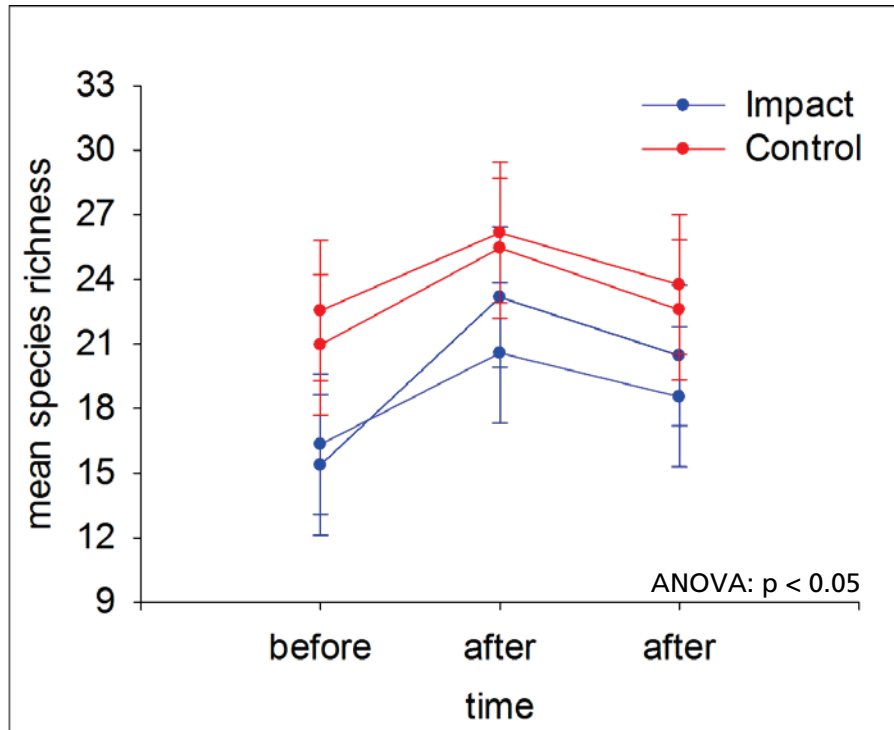2D Stress: 0.14 *Bathyporeia guilliamsoniana*
- • 0.7
- • 2.8
- • 4.9
- • 7

➢ Increased difference in endobenthos between controls and wind farm from before to after construction.
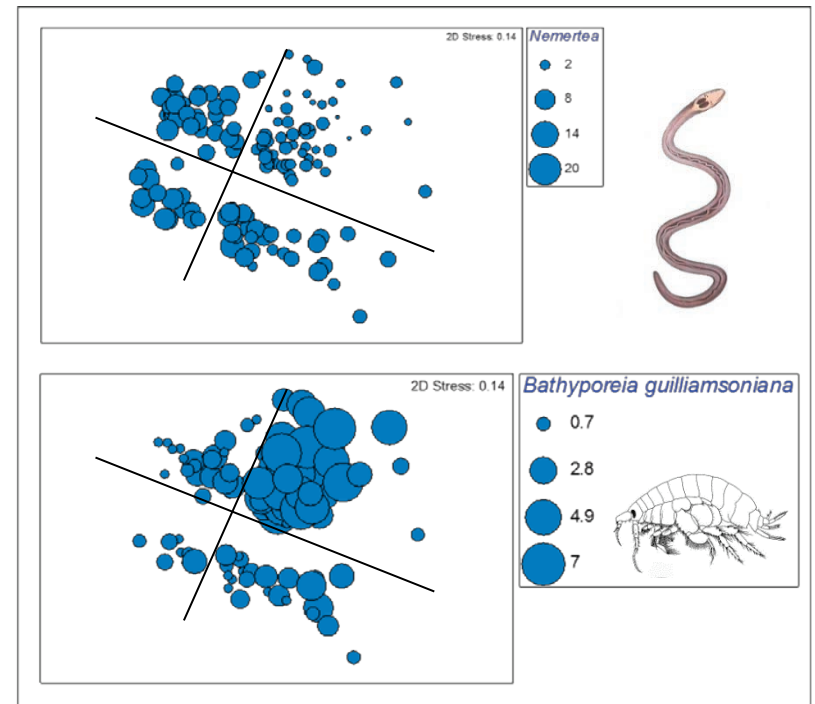
➢ After construction:
  (i)   nemerteans decreased
  (ii) *B. guilliamsoniana* increased
  in impact locations.
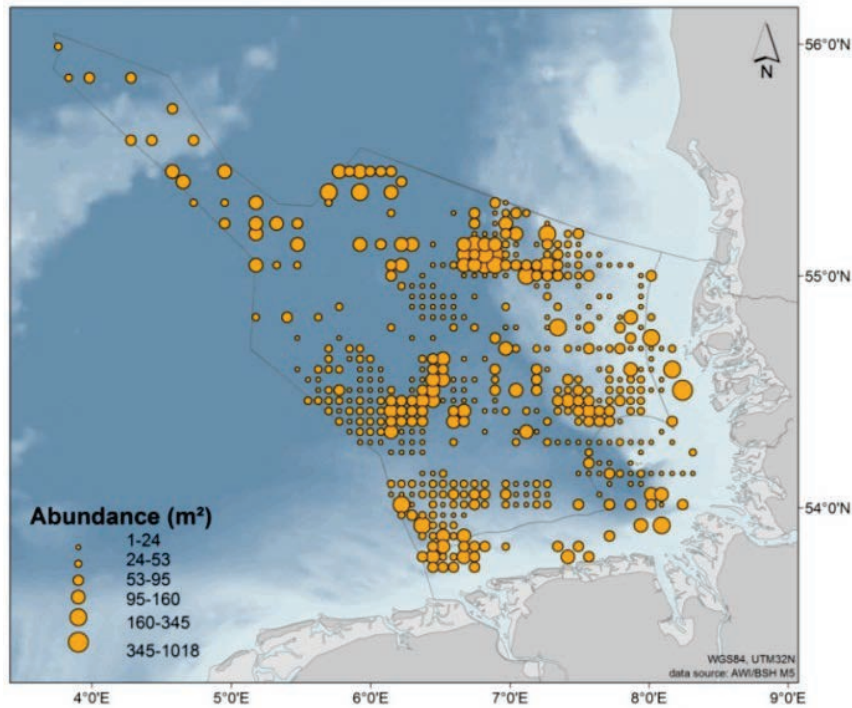
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Survey on **benthic invertebrates**

ANOVA: p < 0.05

> From before to after the construction mean species richness:

(i) do not vary in control locations
(ii) increase in impact locations.

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Fish & benthos database

Average abundance (N m^{-2}) of benthic invertebrates in the German EEZ (grid size: 25 km^2), N = 4586 stations.

➢ Environmental impact assessment (EIA) data are harmonised, quality checked and analysed in combination with monitoring and research data.

➢ More than 9000 EIA and > 2100 AWI station entries for environmental data, fish and benthos.

➢ Identify benthic spatial patterns and main drivers for species distribution.

Fish & benthos database
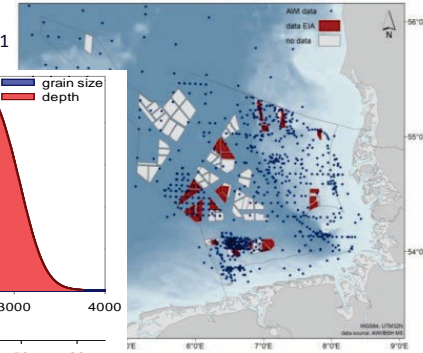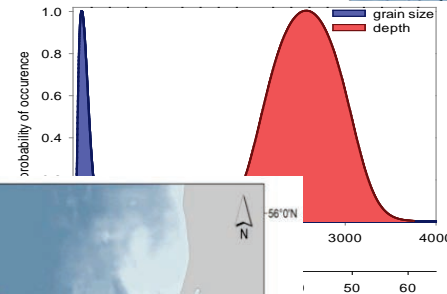
Habitat information
Raster data (full coverage)

Species information
Stations (point data)

Binomial logistic regression model[1]

Bathymetry
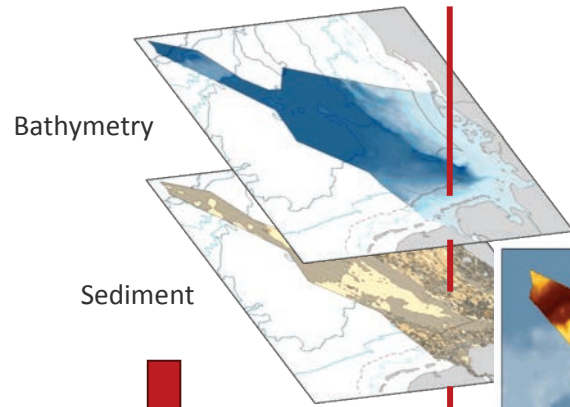
Sediment

Depth & sediment for each (grid) cell of the raster map

Probability of occurence *Callianassa* spp.

Probability of species occurrence at each depth and sediment
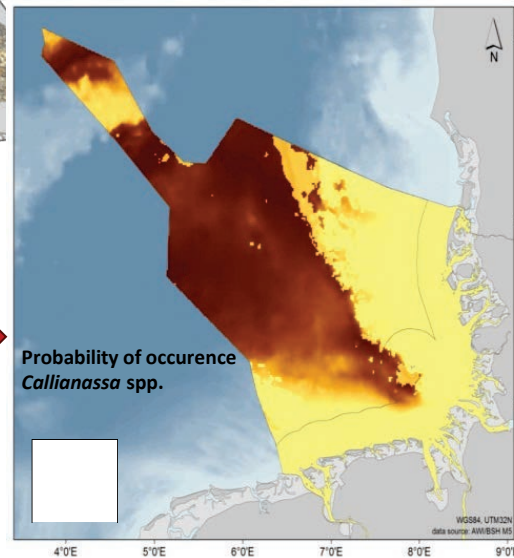
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Perspectives

➢ In the near future the areal extent of planned offshore wind farms will be ca. 25 % of the German exclusive economic zone.

➢ Large scale effects on biodiversity of fish & benthos, and thus economic value of ecosystem services are unknown so far.

➢ Future studies should reveal if spatio-temporal dynamics of fish & benthos at small scales will also occur at large scales.

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Thank you for your attention!