NATURAL VS. ANTHROPOGENICALLY INDUCED VARIABILITY WITHIN COMMUNITIES OF DEMERSAL FISH AND EPIBENTHOS IN THE BELGIAN PART OF THE NORTH SEA: IMPLICATIONS FOR IMPACT MONITORING

INTRODUCTION

The effects of anthropogenic activities such as sand extraction, fisheries, shipping, the construction of pipelines or windmill farms, dredging and dumping of dredged materials on the marine ecosystem are evaluated by numerous monitoring programs. However, the effects of these activities on the benthic life are often difficult to detect against a background of large and small scale natural variability in the environment, especially in the highly dynamic sandbank-dominated habitats in the Belgian part of the North Sea (BPNS). Therefore, a monitoring strategy based on medium term data acquisition at fixed stations is used to evaluate the spatial and temporal variability within the demersal fish and epibenthos communities in the BPNS.

MATERIAL AND METHODS

Beam trawl @ 72 stations

8 campaigns: 6 years impact, reference & general monitoring

361 samples 180 species
Approx. 700,000 individuals
Measurements of environmental variables

RESULTS

A. Community analysis & environmental variables

Coastal 1: SE Kwintebank & Gootebank, high densities, high diversity, spatial extent consistent over years and seasons

Coastal 2: central and east coast (harbours Oostende – Zeebrugge), intermediate densities and diversity, mainly autumn

Coastal 3: central and east coast (harbours Oostende – Zeebrugge), low densities and diversity, mainly spring

Off shore 1 & 2: NW of Kwintebank & Vlakte van de Raan. Truly off shore samples show low density and high diversity; ‘Off shore 2’ combines high density of coastal areas with high diversity of off shore areas. The spatial range of ‘off shore 2’ is inconsistent over years and seasons and induces a difference between sandbank tops and gullies in the off shore region.

CONCLUSIONS AND DISCUSSION

- About half of the variation within epibenthos and demersal fish communities is determined by site specific factors and temporal influences. What about other factors such as the degree of fisheries impact? Fishing effort data are needed to determine impact variation of fisheries!
- The temporal variation in the spatial range of the communities confirms the need for long term data series complementing the Before-After Control-Impact design of assessments.

55% of the variation within the dataset explained by variables depth, salinity, water temperature, and sediment characteristics

Difference coastal 2 - coastal 3 (similar spatial range) determined by mud content => lowest densities and diversities of epibenthos at highest mud content

B. Indications of impact

- At dredge dumping site L20, the impact station generally resorts under ‘coastal 3’ (low diversity, high mud content), while its reference resorts under ‘coastal 2’
- Impact and reference stations of sand extraction and windmill park construction belong to the same communities, but the impact stations are all situated at the ‘poorer’ side of the MDS scattergram.