

Characterization of fish and epibenthic invertebrates associated with the platforms in Al Shaheen oil field using routine inspection ROV videos

Range, P.¹; Jensen, A.M.²; Omerspahich, M.¹; Bach, S.S.³; Thomsen, P.F.²; Torquato, F.²; Sigsgaard, E.E.²; Riera, R.⁴ Ben-Hamadou, R.¹; Moller, P.R.²

1 - Dep. Biological and Environmental Sci., College of Arts and Sciences, Qatar University, Qatar
2 - Natural History Museum of Denmark, University of Copenhagen, Denmark

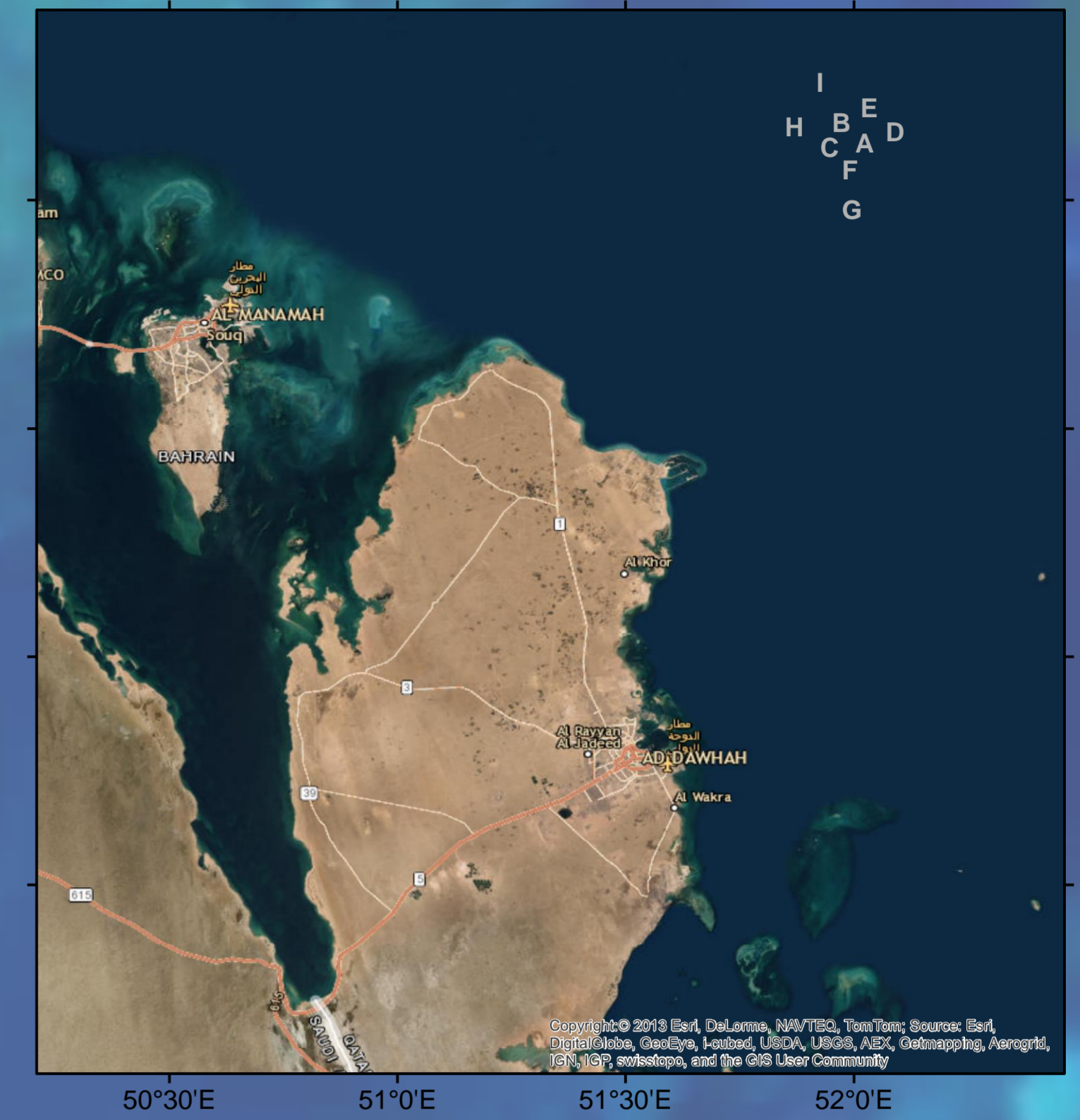
3 - Maersk Oil Research and Technology Centre, Qatar
4 - Centro de Investigaciones Medioambientales del Atlantico (CIMA SL), Spain

Introduction

- Offshore oil and gas platforms provide hard substratum for the settlement of sessile marine invertebrates
- They increase habitat and food availability for fishes and other motile marine organisms, acting as artificial reefs
- There are more than 800 oil and gas platforms in the Arabian Gulf
- Coastal reef habitats in the region are relatively well studied but most offshore reefs (natural or artificial) remain largely overlooked.

Study sites

- This study is focused on the Al Shaheen Field, located in the offshore area called "Block 5", in the NE of the EEZ of Qatar.
- Maersk Oil Qatar is currently operating several oil and gas production platforms at nine different locations within this field.
- The platforms were built in stages, during a period of 13 years, between 1996 and 2009.



Methods

- The platforms are inspected regularly, from the sea surface to the seabed, using Remotely Operated Vehicles (ROVs),
- A total of 4510 inspection videos, collected between 2007 and 2014 were made available for the study.
- The video segments were classified according to depth (ranging from 0 m to 71 m), time of collection, age and position of the inspected platform.
- Within each category, videos were randomly selected for analyses, aiming to achieve a consistent representation and a balanced design



Fig.1) Dominant fish species: *Heniochus acuminatus* (left), *Pomacanthus maculosus* (middle), *Abudefduf* sp. and *Acanthopagrus bifasciatus* (right)

Results

- Up to 85 fish species have been identified around the platforms.
- The most abundant and prevalent fish throughout the study were *Heniochus acuminatus* (Pennant coralfish), *Pomacanthus maculosus* (Yellowbar angelfish), *Abudefduf* sp. (Sergeant) and *Acanthopagrus bifasciatus* (Twobar seabream, Fig. 1).
- Variations from year to year are larger than variations among locations (Fig. 2), with the number of fish species increasing from 29 in 2007 to 47 species in 2014.
- There were fewer fish species in the shallow parts (6 spp, 0-15 m) of the platforms than in the deeper parts (39 spp, >30 m), while most showed a wide vertical distribution along the water column (49 spp, 0-71 m, Fig.2).
- A similar vertical distribution pattern is apparent for the coverage of benthic macroinvertebrates, with diversity and biomass increasing with depth (Fig.4).

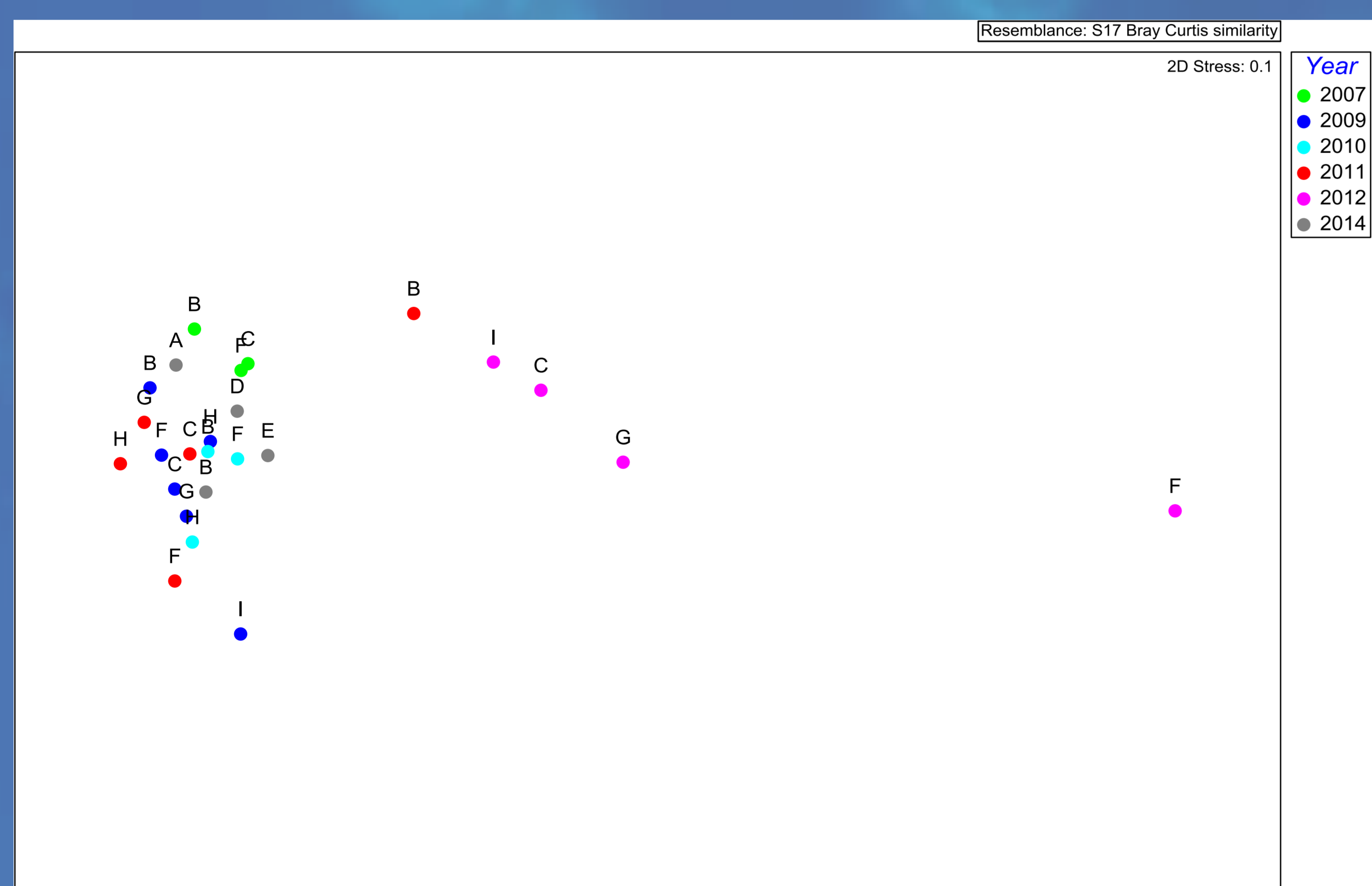


Fig.2) Non-metric multi-dimensional scaling (nMDS) on untransformed abundances of fishes, expressing variations among locations and years.

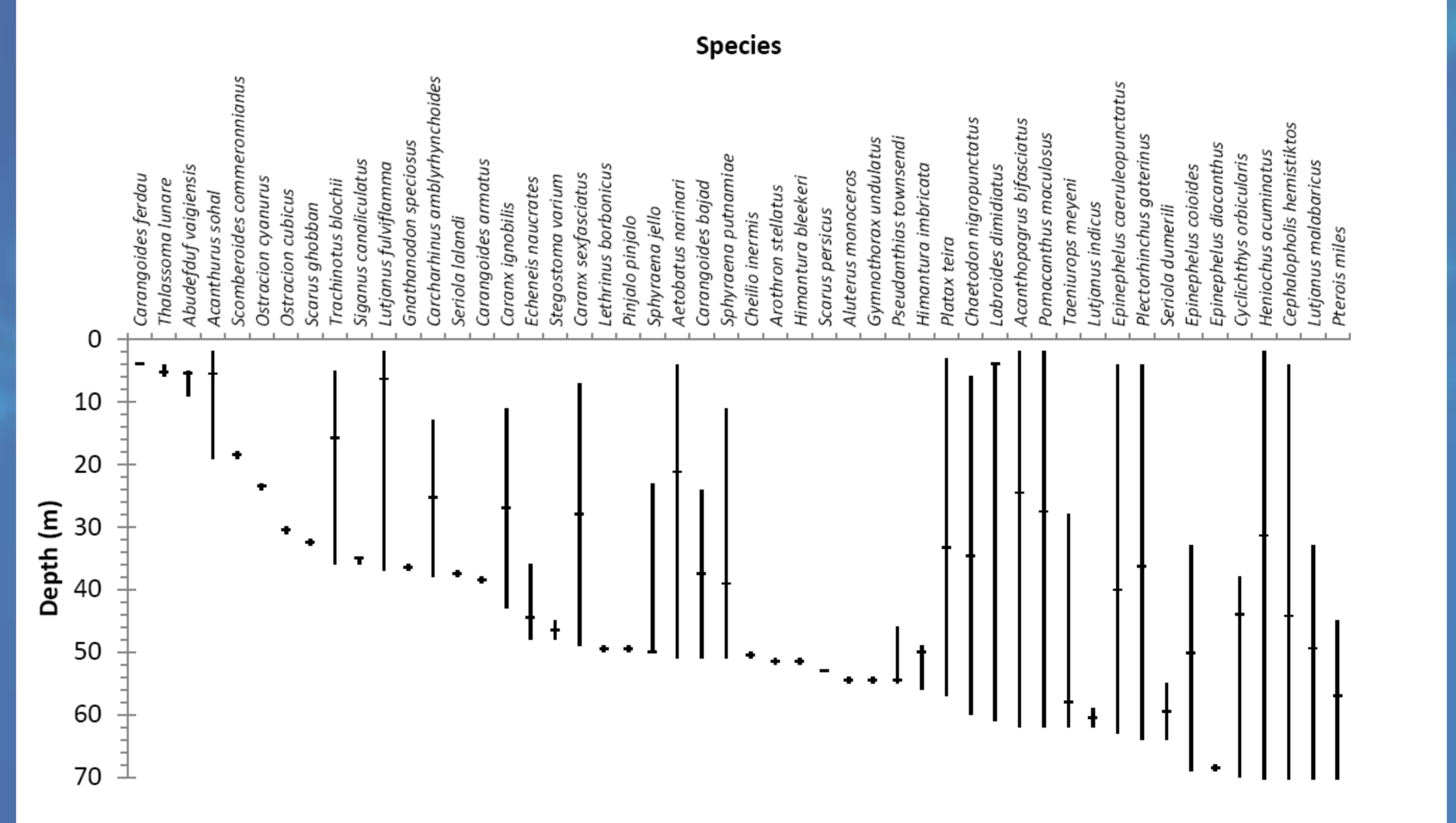


Fig.3) Vertical distribution: Maximum, Minimum and mean depth for each fish species.

Conclusions

- Fishes in the oil platforms showed larger variations among years than among locations.
- Diversity and abundance of benthic invertebrates and fishes tended to increase with depth, in response to variations in temperature, salinity and light intensity.
- The deeper sections of these offshore oil platforms are, therefore, particularly relevant as "artificial reefs", as they provide refuge from the extreme environmental fluctuations of the Arabian Gulf.

Acknowledgements

This work is a contribution of the NPRP project "Connectivity, diversity and genetic flow between offshore natural coral reefs and oil platforms - NPRP No.: 7-1129-1-201", funded by the Qatar National Research Fund (a member of The Qatar Foundation). The statements made herein are solely the responsibility of the authors.



Fig.4) Representative macroinvertebrate cover at different depths: encrusting sponges and bryozoans at 17 m (left), soft-coral *Dendronephthya* sp. at 24.1 m, mixed assemblage of Alcyonaceans and sponges at 43 m (right)