

Richard Holmes outlines how the BGS is helping to evaluate the potential impact of offshore developments on the sea floor with two recent examples from nearshore and remote offshore environments.

Environmental assessment

Programmes of offshore strategic environmental assessments (SEAs) are managed by the UK Department of Trade and Industry (DTI) and are used for predicting and evaluating the environmental implications of a policy, plan or programme that could affect the sea bed. They are aimed at providing information for decisions that could affect the way large-scale commercial energy resources are developed. Currently, they are mainly stimulated by the frequency of offshore energy licensing rounds for oil and gas and consents for offshore wind energy. It is anticipated that the proportion of research associated with developments for renewable energy (wind, wave and tidal) will increase. Research results are published on an area-by-area basis on the web as part of the consultation process with the public and the users, developers and managers of the sea bed. (www.offshore-sea.org.uk).

Since 2001 we have contributed to the programmes of strategic environmental assessment. The geological research has typically involved the following tasks:

- identification of key information sources
- review of the geological context of prospects for oil and gas hydrocarbons

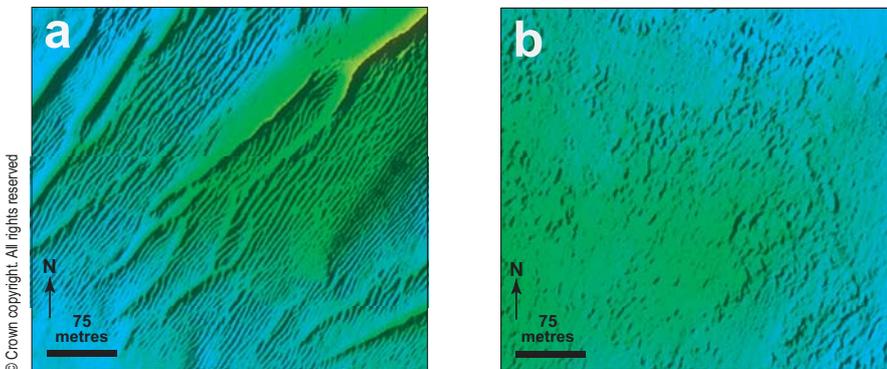
- review of the current understanding of the natural sea bed and shallow geological environments beneath it and how they function on a local and regional basis
- individual investigations of sensitive, unusual, or spatially isolated sea-bed features that are potentially worthy of preservation

- identification of gaps in the understanding of the effects of the activities that would result from oil and gas licensing
- new desk or offshore field research involving data collection, data processing and interpretation to fill in knowledge gaps
- predictions
- strategic overview of each study area reported in plain language.

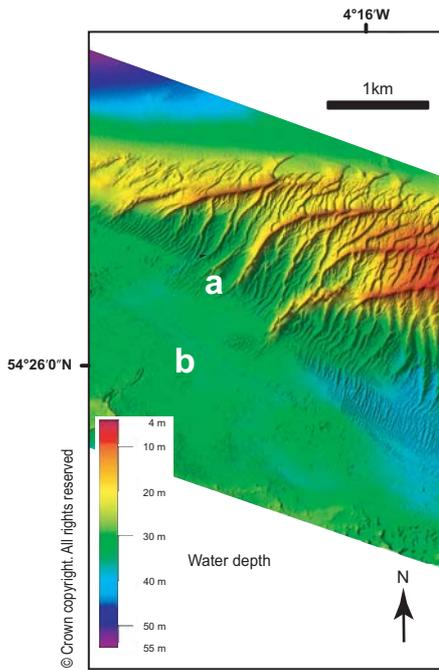
“detailed studies of the sandbanks have discovered that the sea bed is characterised by complex patterns of mobile sand waves”

Nearshore: SEA6

The sea bed is characterised by sand and gravel adjacent to the Isle of Man and by sandy mud further offshore to the east. Licensed acreages for gas exploration and gas fields and consents for wind-farm developments occur to the east of the Isle of Man. The relatively shallow water in this part of the Irish Sea, means that much of the region is prospective for offshore wind farm development. Very strong tidal currents around the Isle of Man and between the island and the mainland to the north mean that the area is also possibly prospective for tidal power.

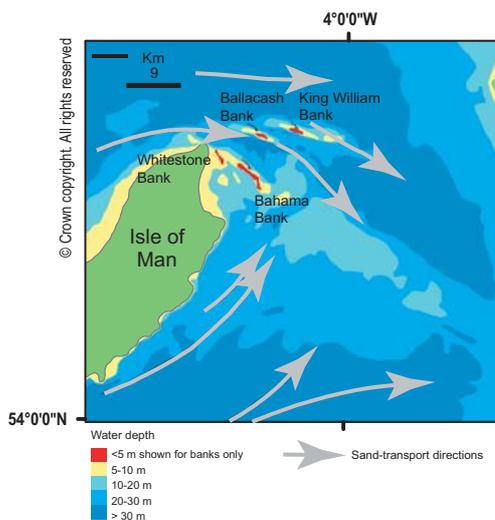


(a) Detail of mobile sand waves on the south flank of Ballacash Bank.
 (b) Detail of sediment waves formed from shells of horse mussels (*Modiolus modiolus*).
 For locations, see a and b on the figure top left, opposite page.



Sand waves at the head of Ballacash Bank. For location, see figure below.

Sandbanks originally formed in tidal eddies to the east of the northern peninsular of the Isle of Man. A long-term rise in sea level has resulted in the sandbanks being isolated and preserved as mid-shelf tidal sand ridges. Detailed studies of the sandbanks have shown that the sea bed is characterised by complex patterns of mobile sand waves and that parts of the adjacent sea bed appear to have been shaped by the influence of



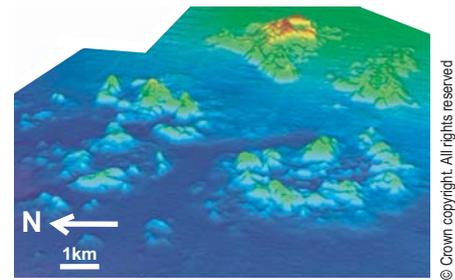
Regional setting of submarine sandbanks formed to the north and east of the Isle of Man.

colonies of horse mussels. Due to their importance to wildlife, the sandbanks in less than 20 m water depth are protected from development plans by European Union environmental legislation.

Remote offshore: SEA4

At a distance of 250 km to the north of Shetland, mud mounds, known as the 'Pilot Whale Diapirs', occur in and adjacent to licensed oil and gas exploration acreage in more than 1500 m water depth. Sediments have been extruded onto the sea bed to form mounds that protrude more than 75 m above an otherwise relatively featureless sea floor. Mound slopes typically range from 5° to 35°. Photographs and samples show that the mounds consist of muddy cohesive sediments mixed with blocks of more consolidated sediment.

We have shown that some of the mound sediments came from rocks that were originally buried more than 500 m below the present sea bed and are more than 25 million years old. The mounds are isolated and feature habitats with



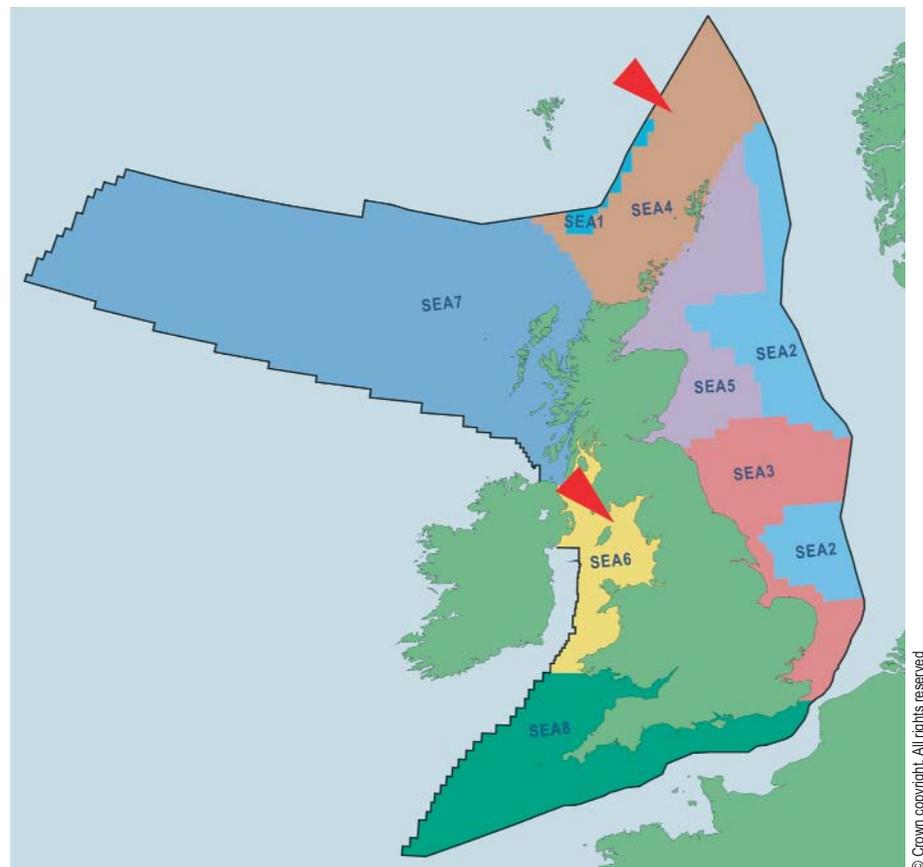
Mud mounds, southern Norwegian Sea.

unusual modern biological species compared to the surrounding sea bed. For these reasons there is an exclusion order to prevent disturbance of the mud mounds during possible future sea-bed developments for exploitation of oil and gas resources.

For further information, contact:

Richard Holmes, BGS Edinburgh,
 Tel: +44(0)131 650 0422
 e-mail: rho@bgs.ac.uk

All images used in this article are a result of DTI's SEA 4 and 6 projects. The figures may be seen on www.offshore-sea.org.uk



Areas of offshore strategic environmental assessment.