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## **JOINT NATURE CONSERVATION COMMITTEE**

### **DARWIN MOUNDS PROPOSED SPECIAL AREA OF CONSERVATION**

**Paper by Charlotte Johnston and Mark Tasker**

#### **1. Introduction**

- 1.1 Work on Offshore Natura previously reported to Committee (JNCC 02 D01) has identified areas of habitat listed on Annex II of the Habitats Directive present in UK offshore waters. These consist of 'reefs', 'shallow sandbanks' and 'submarine structures made by leaking gases'. The EU definition of reefs includes 'biogenic' reefs such as those formed by cold water corals. Areas of habitat must be considered against selection criteria in the Habitats Directive for the selection of Special Areas for Conservation (SACs).
- 1.2 The Secretary of State for Environment, Food and Rural Affairs, in her press release of 1 May 2002, announced 'extra protection for species and habitats under threat, such as the Darwin Mounds, a unique area of cold water corals to the north west of Scotland, by extending the Habitats and Birds Directives to cover all UK waters'. UK Regulations to fully implement the Habitats and Birds Directives in UK offshore waters are expected to be laid before Parliament in Autumn 2002.
- 1.3 The issue of offshore sites damaged by fishing operations outside UK territorial seas is dependent on European Community action. The Government has alerted the European Commission that it anticipates the need for the Commission to take measures for the appropriate regulation of fisheries for Natura sites in offshore waters. However, for the Commission to take such measures, the Member State has first to submit to the Commission the proposed SAC. Such submissions may be made to the Commission in advance of UK Regulations fully implementing the Habitats and Birds Directives in the UK offshore area.
- 1.4 Government have asked the JNCC, in the light of the present and imminent threat to the site, and the need to generate action at a Community level on fisheries, to assess the Darwin Mounds against the criteria for selecting sites as SACs, and advise them as to its selection.

**2. The incidence of cold water coral reefs in UK and outside UK waters**

2.1 There are comparatively few organisms capable of forming biogenic reefs in the offshore waters of the UK. The best known of these are cold water coral reefs composed principally of the scleractinian coral *Lophelia pertusa* (see Figure 1). *Lophelia* is widely distributed globally, but most records come from the North East Atlantic. It occurs in waters with a temperature range of between 4 and 12°C, and a relatively high water flow. Locations of sites where the species has been recorded, and its predicted wider distribution in the North East Atlantic, are shown in Figure 2. Whilst the species is typically found in small colonies or clumps growing on hard substrata, including wrecks and oil platforms, in certain circumstances it has the potential to form large biogenic reefs with other cold water coral species. The largest known such reef (the Sula Ridge, in Norwegian waters) is up to 30m in height, 100s of metres across and 13 km in length (Friewald *et al.* 1999). Further, smaller examples of cold water coral reef in the North Atlantic occur in Norwegian waters, good examples are known from western Irish waters in the Porcupine Bight, and the Darwin Mounds area in UK offshore waters.

**3. The importance of the Darwin Mounds as an example of a cold water coral reef site**

3.1 Nearly all of the records of *Lophelia* in UK waters are of small fragments either sampled by trawl or grab. Three sites are slightly better known: the wreck of the 'Hurtside' (west of Shetland), some sites examined by Wilson (1979) on the Rockall Bank (approximately 200 nautical miles west of the Hebrides), and the Darwin Mounds (see Figure 3 for location). The wreck of the 'Hurtside' supports a small clump of *Lophelia* (maximum dimension in any direction: 1m). It is probably protected from damage from towed trawl gear by being on this wreck. The Rockall Bank was visited in the early 1970s, when *Lophelia* was present in thickets 10-13m across, scattered on the upper flanks of the bank. This area has been heavily trawled since that date and it is not known if *Lophelia* reefs are still present. The Darwin Mounds were discovered using remote sensing techniques in May 1998, and have been further investigated by remote video and sampling in 1998, 1999 and 2000 (Bett 1999, Bett and Jacobs 2000, B. Bett, pers. comm.).

3.2 The mounds, named after the research vessel *Charles Darwin*, are at a depth of approximately 1000m, and cover an area of approximately 100 km<sup>2</sup>. They consist of some hundreds of mounds in two main fields referred to as Darwin Mounds East and Darwin Mounds West (Figure 4). Other mounds are scattered at much lower densities in nearby areas. The mounds are comprised of cone shaped mounds of sand, termed 'sand volcanoes', with living stands of *Lophelia pertusa* and other cold water corals at their summits. Each of the mounds is approximately 100m in diameter and 5m high, and distinguished by a 'tail' feature visible on sidescan sonar. The corals themselves provide a habitat for various species of larger sessile or hemi-sessile invertebrates such as sponges and brisingiids. The mounds support significant populations of the xenophyophore *Syringammina fragilissima* (a 15 cm diameter single celled organism) that is widespread in deep waters, but occurs in particularly high

densities on the mounds and the tails. Various fish have been observed, but not apparently at significantly higher densities than the background environment.

- 3.3 Not only are the Darwin Mounds the best example of cold water coral reef known in UK waters, but the 'tail' feature of the mounds is apparently unique globally. The mounds are also unusual in that *Lophelia* appears to be growing on sand rather than a hard substratum. Prior to research on the mounds in 2000, it was thought that *Lophelia* required a hard substratum for attachment.

#### 4. Evidence of damage

- 4.1 Cold water coral reefs are vulnerable to damage from towed fishing gear. The very large cold water coral reefs off Norway have been seriously damaged (Fosså *et al.* 1999), and Norway has consequently designated its most important reefs as reserves and banned towed-gear fisheries from within them. The Darwin Mounds are also vulnerable; suggestion of damage was provided from sidescan sonar images in 1999 (shown in Figures 5 and 6), and new damage was visible over about a half of the Darwin Mounds East during summer 2000. This damage was visible as smashed coral strewn on the seabed. A trawler was operating nearby during the surveys. Given that *Lophelia* appears to need (or favour) the elevation provided by the sand volcanoes for growth in this area, it seems likely that this damage will be permanent.

#### 5. Recommendation

- 5.1 Given its importance as the best example of cold water coral biogenic reef known in UK waters, and the imminent and current threat that this site is under, protection of this unique reef habitat in UK waters is required as soon as possible. We therefore propose that the Darwin Mounds be recommended to Ministers for submission to the European Commission as a candidate SAC.

#### 6. References

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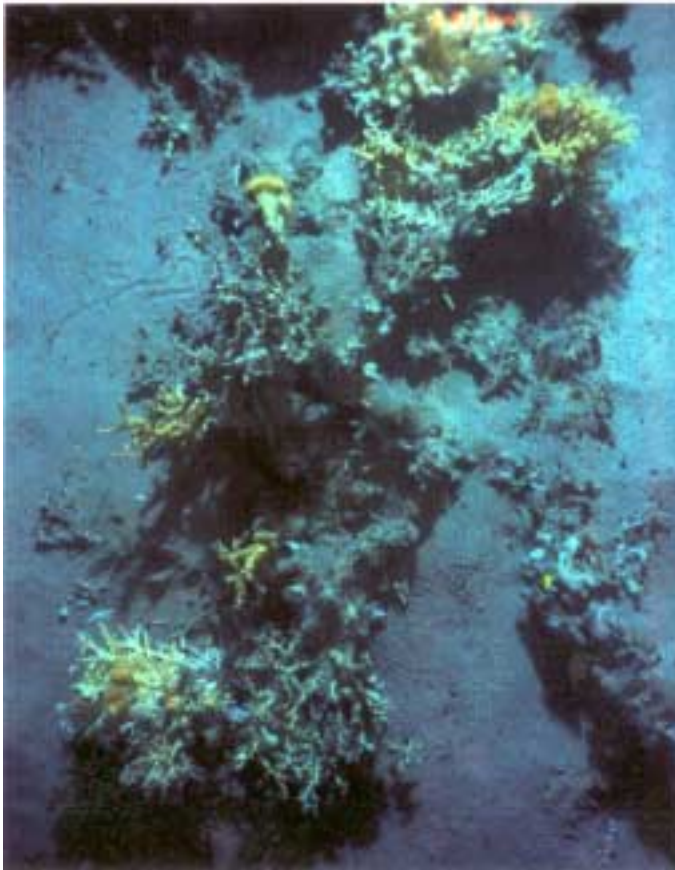


Figure 1 Cold water coral 'thicket' (Photo courtesy Brian Bett, Southampton Oceanography Centre)

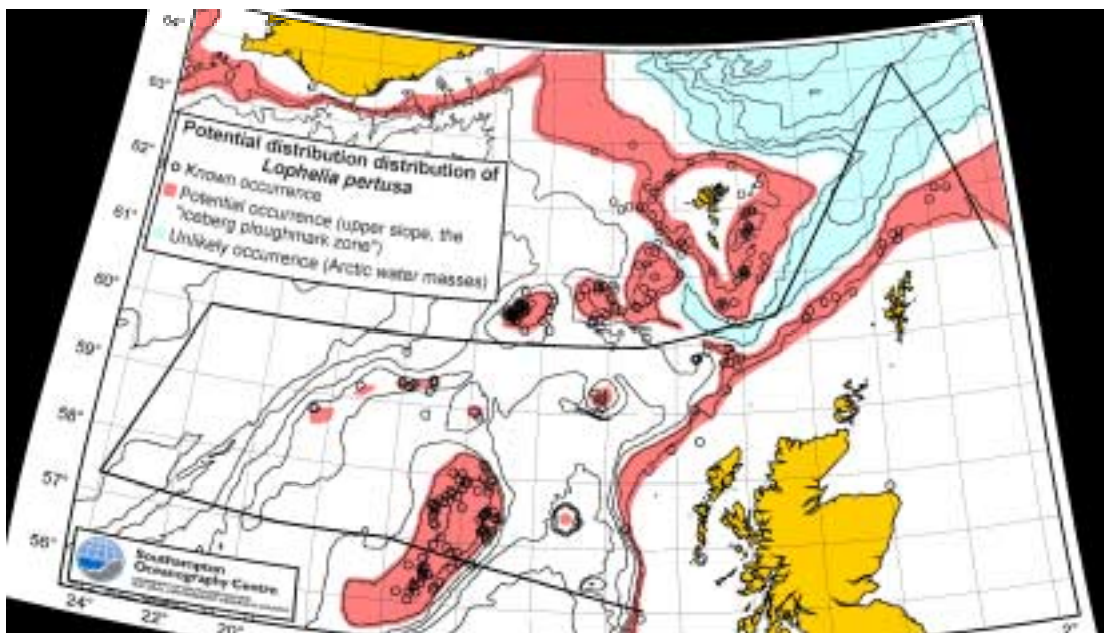


Figure 2 Records of *Lophelia pertusa* (both historical and recent) in the North East Atlantic and its potential distribution (courtesy Brian Bett, Southampton Oceanography Centre). Thick black line approximates to UK offshore area.

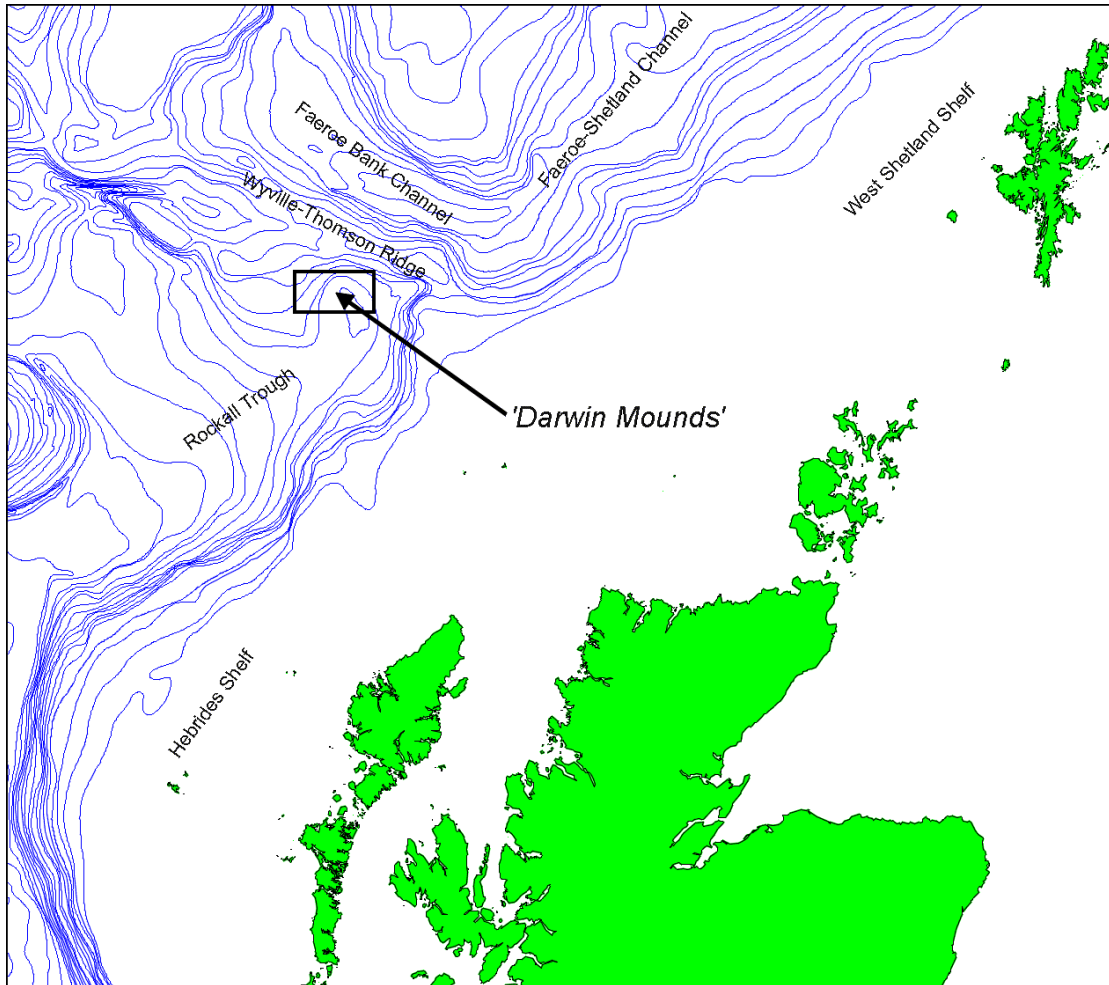


Figure 3 Location of the Darwin Mounds (courtesy Brian Bett, Southampton Oceanography Centre)

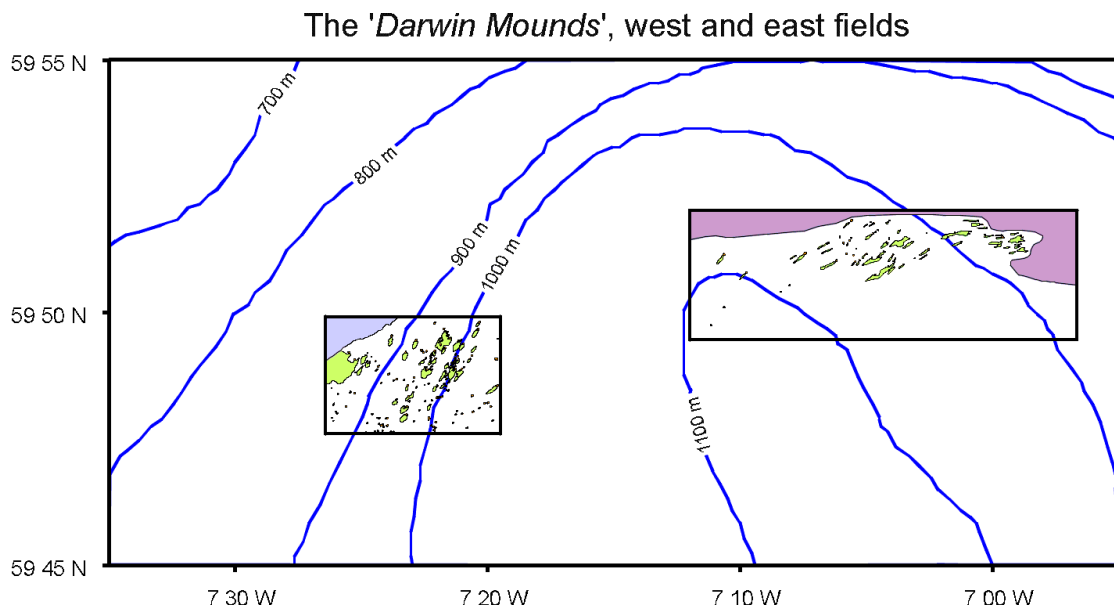


Figure 4 Darwin Mounds west and east fields (courtesy Brian Bett, Southampton Oceanography Centre)



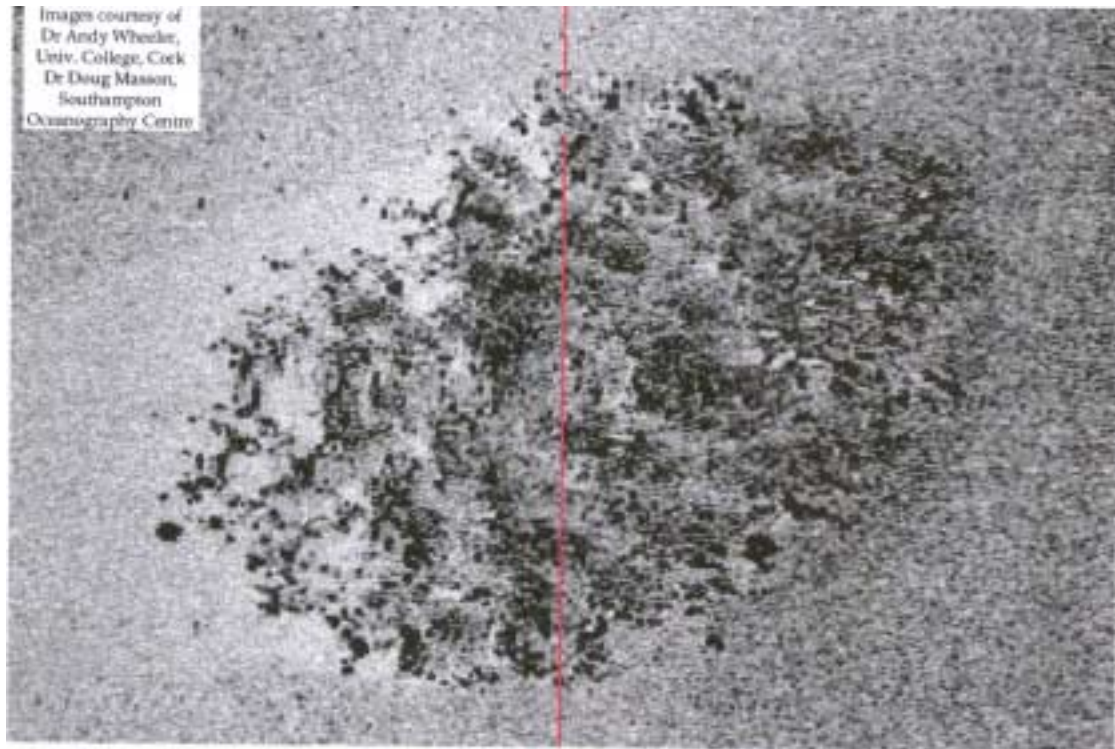


Figure 5 Sidescan image of individual mound (typically 100m diameter, 5m high). Dark areas represent *Lophelia* colonies. Vertical red line represents distance marker from centre of sidescan sonar image.



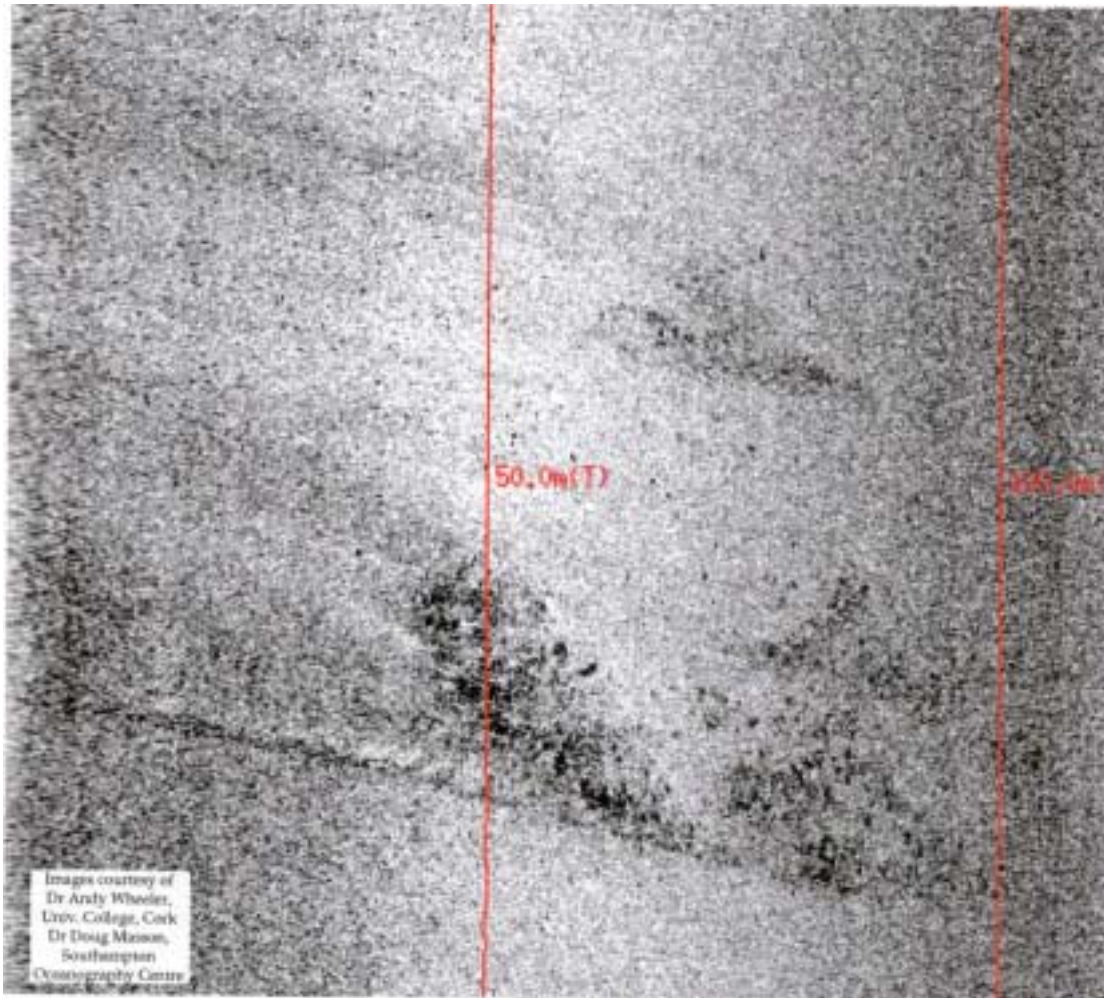


Figure 6 Sidescan image of individual mound (c. 70m diameter) believed to show the effects of deep sea trawling. Dark areas represent *Lophelia* colonies and are much reduced, and there are clear streak-like, linear marks believed to be left by a trawl being dragged across the seabed.