2002-06-01

Our very own coral reef crisis

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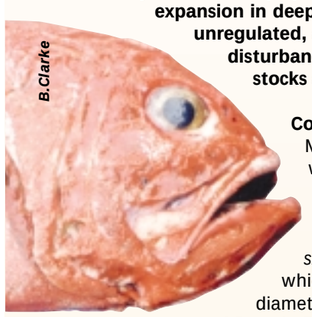
The past decade has seen trawling operations expand along the edge of the North East Atlantic continental shelf, as stocks of shelf-dwelling species such as cod have declined. As a substitute, markets are being developed for very strange-looking deep-water species such as roundnose grenadier (*Coryphaenoides rupestris*), orange roughy (*Hoplostethus atlanticus*), black scabbard fish (*Aphanopus carbo*) and deep-sea sharks (*Centrophorus squamosus* and *Centroscymnus coelolepis*). The problem is that this expansion in deep-water fisheries goes on unregulated, and it is causing long-term disturbance to seabed habitats and fish stocks alike.



Coral Reefs in the North Atlantic?

Most of us associate coral reefs with warm, well-lit waters off tropical coasts, and the only hard coral I'd seen whilst diving in the UK was *Caryophyllia smithii* (the Devonshire cup coral), which grows to about 1.5 cm diameter. But on a visit to the University of Brest in France, I was shown an amazing collection of corals by Valerie Allain, a PhD student studying deep-sea fish. Some of the corals were the size of filing cabinets, so I first assumed that they must have come from the tropics. It turned out that Valerie's huge colonial corals had been trawled up during commercial fishing hauls at depths of 840-1300 m off the west coast of Ireland.

Deep-water corals occur world-wide and have been known by fishermen and benthic ecologists for centuries. However, they remain poorly studied and it is not until the past five years that video material from manned and unmanned submersibles has started to show a wider audience just how spectacular these reefs can be. One of the more familiar species is *Lophelia pertusa*, but at least four others have been by-caught in waters off West Ireland.

Photo 1. Trawled *Lophelia pertusa* grounds at 200 m in the Iverryggen area, W Norway, May 1999. Smashed coral fragments litter the sediment around a clear trench from towed fishing gear (arrow). Lower edge of photograph *ca* 1.5 m.

The Problem with Deep-water Trawling

Deep-water coral reefs take centuries and even millennia to build up, only to be destroyed when they are taken as bycatch in fisheries along with a range of other animal species. Table 1 shows the entire *vertebrate* catch from a coral-rich haul taken recently in the Rockall Trough. It shows just how wasteful deep-water trawling can be, as most of the fish were discarded. In addition, habitat damage has to be very long-term, as the accompanying by-caught corals were determined as being over 4,550 years old!

The same problem occurs off Norway. Jan Helge Fossa, of the Institute of Marine Research, Bergen, recently used a remotely operated vehicle (ROV) to survey two cold water coral reefs at 200m depth in West Norway. The first site had been intensely trawled for redfish (mostly *Sebastes marinus*) and saithe (*Pollachius virens*) during the 1990s. The second site was untrawled. The trawled area had sparse living coral colonies that were often broken, dislodged and sometimes buried in mud. Looking at photo 1, one sees trenches (5-10 cm deep) left by otter boards, providing unmistakable evidence of trawling activity. Coral rubble litters the whole area, and scrape-marks on the sediment surface show where boulders and coral had been dragged along the seabed by trawl gear. This contrasts starkly with the untrawled area (photo 2) that had no visible trawl scars and instead has prominent expanses of erect, live coral reefs. The untrawled habitat has a greater relief and three-dimensional complexity than the trawled reef, and more sessile filter-feeding macrofauna such as large *Mycale* sponges.

Acoustic surveys, too, have raised serious concerns about the ecological effects of deep-water trawl fisheries. Trawl marks now criss-cross the seabed at 200-1400m depth all along the NE Atlantic shelf-break area from Ireland, Scotland and Norway. These trawl scars are up to 4 km long and characterised by parallel trenches where otter doors, rockhopper gear and nets have damaged epifauna, dragged rocks and turned-over sediment.

Photo 2. Untrawled *Lophelia pertusa* interspersed with *Mycale* sponges standing erect to form a prominent reef at 200 m, Nordleksa, W Norway, May 1999. Lower edge of photograph *ca* 2.5 m.

Fishing Perspective

On typical 15-day trips, trawlers sweep about 33 km^2 of continental shelf-break (the edge of the continental shelf) habitat. Although the fishers do not deliberately target deep-water corals, and indeed try to avoid dense coral reefs, damage does occur. French deep-water fishermen target sedimentary areas on the upper part of the continental slope. Out of 229 trawls observed in 1995-97, only 5 were notable for containing large amounts of coral by-catch. The corals caused poorer catch quality and damaged the nets, which had to be repaired before the gear was reused.

Hamish Morrison, Chief Executive of the Scottish Fishermen's Federation, says corals also damage the nets of the UK monkfish fleet. He calls for closer co-operation between the fishing industry and EU governments to prevent both long-term ecological damage and damage to fishing gear.

The realisation of the extent of damage to deep-water corals off Norway, and also off Tasmania, Australia, led to a rapid response from national governments. In Norway, fishers first warned of widespread reef damage by trawlers in 1994, leading to ROV surveys and then areal closures to prevent long-term ecological damage to selected coral reefs in 1999.

The Need for Action

The problems in EU waters described in this article emphasise that conservation areas are urgently needed to protect coral reefs within the Exclusive Economic Zone of EU waters; and that the EU and the member state Governments are being far too slow to react.

In 1999, the UK High Court ruled that the EC Habitats Directive (92/43/EEC), which covers reefs in Annex 1, applies to the UK Continental Shelf waters up to a limit of 200 nautical miles. In October 2001, Margaret Beckett, Secretary of State for the Department of Environment, Food and Rural Affairs (DEFRA) announced that the Darwin Mounds, an area off northwest Scotland that is rich in cold-water corals, was expected to be the first offshore site to be confirmed as a Special Area of Conservation. However, the deep-water reefs of all EU countries still remain unprotected from current industrial fishing practices.

Areas where corals are known to be at risk of damage, such as NW Rockall and the recently described Darwin Mounds (see *Marine Conservation* Summer 2001) should be afforded legislative protection as soon as possible.

There is also an urgent need for DEFRA, Government Conservation Agencies and the EC Fisheries Department to work closely with the fishing industry to minimize long-term environmental damage to deep-sea habitats. One powerful tool which could be employed for protection in offshore waters is the recent agreement made between EU member states, the Faroes, Iceland, Greenland, Russia and Norway to satellite-track all vessels >24 m (Article 3, Regulation (EEC) 2847/93). Concerted action of various kinds is needed to protect our very own coral reefs.

Deepwater targets: Roundnose grenadier and opposite, orange roughy

Table 1: Vertebrate catch from a coral-rich haul at 1270 m in the Rockall Trough, W. Ireland, March 1996. * indicates species landed commercially.

Common name	Taxon	Number	Weight (kg)
Roundnose grenadier *	*Coryphaenoides rupestris*	480	400
Roundnose grenadier (small discards)	*C. rupestris*	902	407
Orange roughy *	*Hoplostethus atlanticus*	80	200
Leafscale gulper shark *	*Centrophorus squamosus*	27	150
Portuguese dogfish *	*Centroscymnus coelolepis*		
Baird's smooth-head	*Alepocephalus bairdii*	750	2400
North Atlantic codling	*Lepidion eques*	50	18
Smalleyed rabbitfish	*Hydrolagus affinis*	37	16
Spearnose chimaera	*Rhinochimaera atlantica*	4	24
Roughnose grenadier	*Trachyrincus murrayi*	325	80
Spearsnouted grenadier	*Caelorinchus labiatus*	125	31
Dogfish sharks	Squalidae	216	351
Risso's smooth-head	*Alepocephalus rostratus*	6	-
Pallid sculpin	*Cottunculus thomsonii*	2	-
Pudgy cuskeel	*Spectrunculus grandis*	1	-

Further reading:

Jason Hall-Spencer, Valerie Allain & Jan Helge Fossa (2002) *Trawling Damage to Northeast Atlantic Ancient Coral Reefs* Proceedings of the Royal Society, London B p.507

Information on *Lophelia Pertusa* can be found at the website of the Scottish Association for Marine Science **www.sams.ac.uk**

The leaflet 'A Dead-end for Deepwater Fish' is available from MCS

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