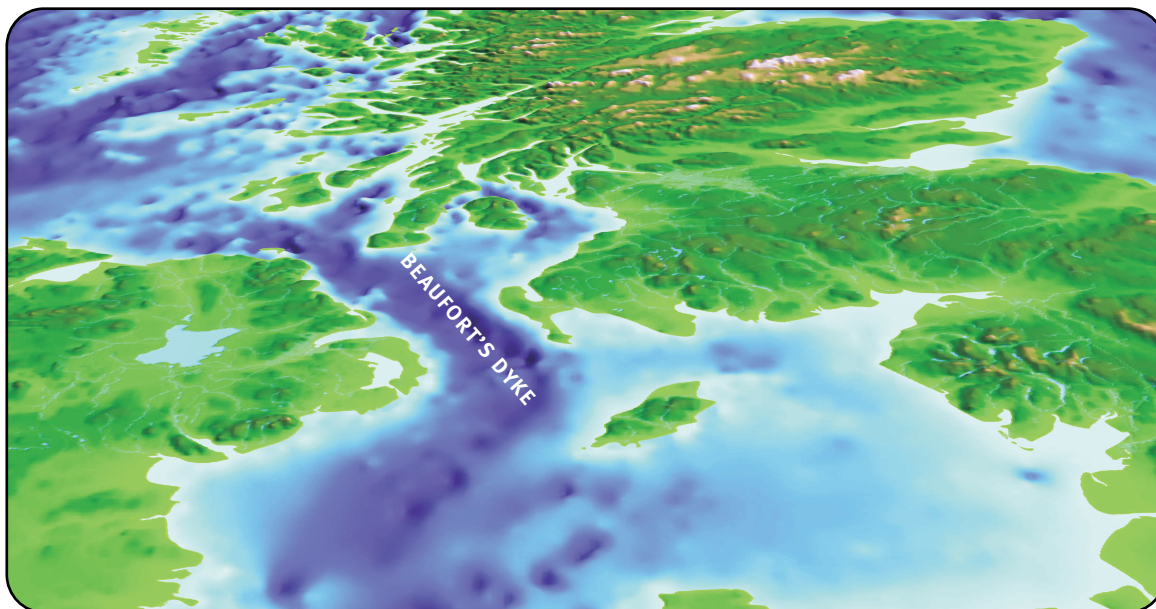




CASE STUDY : Munitions Dumping at Beaufort's Dyke



Introduction

In 1995 large numbers of incendiary devices were discovered around the coastline of the Firth of Clyde and adjacent areas. The discovery of these stranded devices coincided with the laying of a submarine gas pipeline which links Scotland to Northern Ireland. The gas pipeline passes to the north of the Beaufort's Dyke explosives disposal site.

A degree of public alarm was raised when the incendiary devices were washed ashore. As they dried, some of the devices ignited.

Munitions

After the two world wars, large quantities of surplus munitions were dumped at sea. These munitions, which ranged from small arms to high explosives, were dumped

at both charted and specially selected disposable sites. The precise locations and nature of the munitions were often poorly documented.

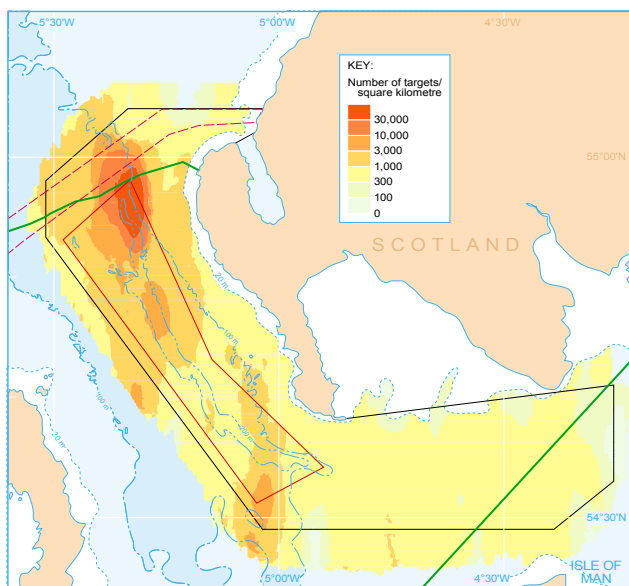
Beaufort's Dyke, a deep trench which lies between Scotland and Northern Ireland, was one of the sites used extensively for sea disposal. This trench measures more than 50 km long and 3.5 km wide. The depth of the area and proximity to the coast made it an ideal location for a munitions dumping ground. At that time it was not an important fishing ground.

Following the discovery of the incendiary devices on the shore, Fisheries Research Services (FRS) was commissioned to undertake a survey to determine the distribution of the munitions within and around Beaufort's Dyke. FRS was also asked to establish whether dumping had contaminated seabed sediments, fish or shellfish. FRS investigations were carried out in November 1995, and between March and July 1996.



Seabed Surveys

FRS' research vessel, FRV *Clupea*, undertook four scientific cruises during this research. An acoustic survey was undertaken using RoxAnn™, and munitions detected using specialised techniques such as side-scan sonar,



Map of North Channel and northern Irish Sea, showing the distribution and densities of larger munitions, munitions-related materials and unidentified man-made debris derived from combination of the side-scan sonar, underwater television and pulse induction data (number of targets/square kilometre).

pulse induction and magnetometry. These techniques permitted detailed seabed imaging to determine the depth and nature of the seabed, and the distribution and density of dumped munitions and seabed debris. Underwater television cameras, used in conjunction with high quality still photography provided information on the nature of the munitions and the debris. In addition, FRS staff collected and analysed samples of seabed sediment, fish and shellfish for signs of contamination.

Munitions Distribution

The survey covered a total track of over 950 km, and confirmed that munitions were distributed over a wide area which extended outside the boundary of the charted dump site. The largest concentration of dumped munitions was found in an area located within, and adjacent to, the northeast sector of the charted disposal site. In this area, and in other smaller areas, large quantities of munitions were found to be outside the boundary of the dump site. The areas containing large quantities of munitions included areas crossed by the submarine gas pipeline. The findings led to a revision of the Admiralty charts for the Beaufort's Dyke area. These charts are the standard seabed charts used for navigation in UK waters.

Seabed Contamination

Samples of the seabed sediment were analysed. None of the samples contained the chemical warfare agents phosgene or mustard gas, or explosive or propellant residues. There was also no indication of phosphorus, which is a component of the incendiary devices. The levels of trace metals were found to be within the ranges reported for other Scottish coastal areas, and similar to the levels found in the Irish Sea.

Marine Wildlife Contamination

Fish and shellfish samples were analysed and were not found to contain explosive or propellant residues. The levels of heavy metals were within the ranges reported in commercial catches from elsewhere in UK waters.

It was concluded that dumped munitions were located outside the charted boundary of the disposal site, but that dumping had not resulted in contamination of seabed sediments or of commercially exploited fish or shellfish.

Other Uses

The munitions distribution data have already proved invaluable in the planning of the new routes for electricity and telephone cables crossing Beaufort's Dyke.