Concerns relating to dumped munitions

Information on the location and type of munitions dumped in the Convention Area was supplied by Contracting Parties and published by OSPAR (2005). The report identified over 140 dumpsites throughout the Convention Area and this is believed to be the best information available (Figure 2.1). One of the major difficulties in managing the risks associated with munitions dumpsites, highlighted in a number of reports (HELCOM, 1994 and FRS, 1996), is the uncertainty associated with their locations. Figure 2.1 shows that, in general terms, the distribution of known conventional munitions dumpsites tends to be in inshore waters whereas chemical weapons were dumped further offshore.

Dumping operations included dumping overboard from vessels and by sinking ships containing conventional and chemical weapons (OSPAR, 2004a). Best estimates suggest that in excess of one million tonnes of munitions were dumped in the Beaufort's Dyke, some 168 000 tonnes of ammunition were dumped in the Skagerrak (OSPAR, 2005), some 300 000 tonnes of munitions of various types such as bombs, grenades, torpedoes and mines were dumped in the North Sea (RWS, 2007) and an estimated 35 000 tonnes were dumped off Knokke-Heist, Belgium (OSTC, 2002). The materials dumped range from conventional munitions to phosphorus incendiary devices to chemical munitions containing mustard gases and other substances. Detailed information on the appearance and types of chemical munitions is given in the OSPAR framework for developing national guidelines for fishermen on how to deal with encountered conventional and chemical munitions (OSPAR, 2004a).

Of particular concern is the possible consequence of contact with chemical warfare agents. Marine dumped chemical munitions react differently in water depending on the agent or agents they contain. The munitions shell may break open during the dumping operation or may corrode over time, allowing the agents to leak out. For example, the water-soluble nerve agent Tabun, a clear, colourless, tasteless liquid with a faint fruity odour originally developed as a pesticide but with more potent toxic effects (CDC, 2008), and many other chemical warfare agents would be rapidly mixed with seawater and diluted, thus having a very short-term effect. However, certain types of thickened mustard gas[1] that are insoluble in water could remain on the seabed for a very long time and injuries could occur as a result of contact with them. Simply touching chemical agents or inhaling the vapours is extremely dangerous and it is important to have in place procedures for dealing with munitions when encountered. The OSPAR Commission has provided advice on developing national guidelines for fishermen on how to deal with encountered conventional and chemical munitions (OSPAR, 2004a).

Planned explosions during the laying of pipelines close to dumped munitions can initiate further detonations. There are concerns that seismic pulses have the potential to damage the thin skin or container of chemical munitions thus increasing the number of chemical releases in an area at one time. There is evidence that due to chemical reactions certain explosives that have been dumped may become more unstable and sensitive to shocks and are even more dangerous to deal with than the original substance (Long, 2005). A recent report from the British Geological Survey confirms that conventional munitions undergo spontaneous detonation on the seabed and spontaneous explosions, or explosions for which there are no known reasons, occur in the vicinity of munitions dumpsites (BGS, 2005). The consequences of such spontaneous explosions depend on factors such as the size of the explosion, proximity to: other dumped conventional and chemical munitions; sensitive species and habitats; infrastructure such as cables, pipes, offshore platforms and wind farms; and passing vessels. Explosions associated with dumped munitions may affect marine fauna. Marine mammals and fish can be hurt or even killed by the shock wave and the high sound pressure following an explosion. Harbour porpoises can be killed within four kilometres of large explosions and their hearing can suffer permanent damage as far away as 30 kilometres (NABU, 2007).

[1] Mustard gas, also known as sulphur mustard, can be a vapour, an oily-textured liquid or a solid. In its pure form it is a transparent, slightly volatile, oily substance with a sweet smell. The smell is very similar to cress, horseradish or mustard. Mustard gas normally occurs with impurities which give it a brown colour.

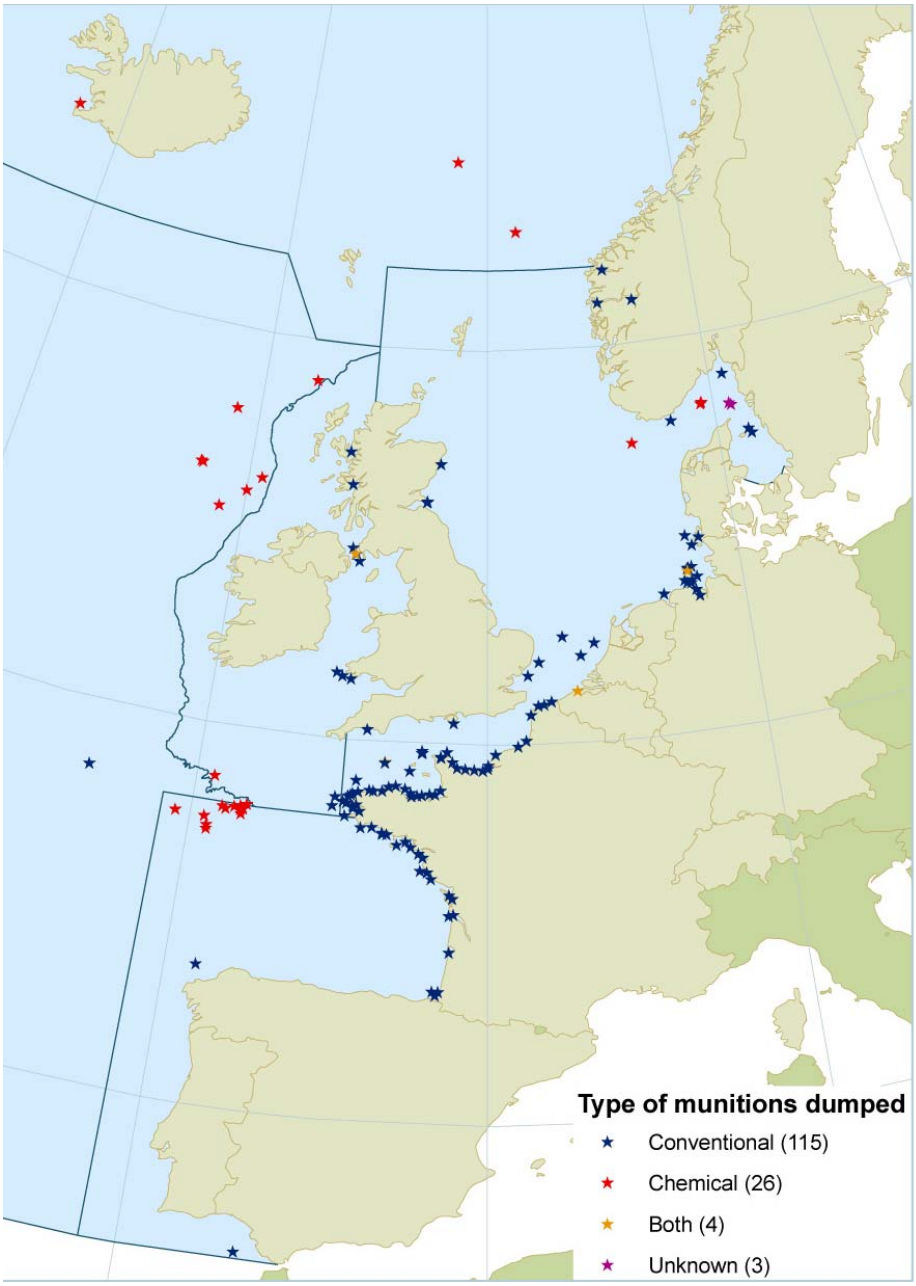

***Figure 2.1**: Location of known munitions dumping sites and type of munitions dumped*

According to Beddington and Kinloch (2005), there are three basic types of danger that munitions dumped at sea can cause:

(i) direct physical contact with either chemical or conventional munitions resulting in threats to human health;

(ii) contamination of marine organisms and the environment in the vicinity of dumped munitions and the consequent potential for some concentration of toxic contaminants entering the wildlife and human food chains;

(iii) spontaneous explosions which can be directly life threatening, but also have the potential to spread material away from the dump sites thereby increasing the potential for more of it to come into direct physical contact with individuals.

Direct physical contact or disturbance of munitions can occur with various marine activities for example fishing, laying cables and pipes, sand and gravel extraction and diving. Encounters associated with each of these activities have been reported by Contracting Parties to OSPAR, but the majority of encounters, 59% of all reported, were associated with fishing activities.

Quality assured data on persistence, bioaccumulation and toxicity for chemical and conventional warfare agents dumped in the marine environment is lacking (Beddington and Kinloch, 2005). Without these data and, on a case by case basis, detailed information on the precise location of munitions, the condition of the casings and the active chemical and/or explosive components, a detailed environmental assessment of the actual or potential impact of past dumped munitions is not possible. One of the most comprehensive studies carried out on a dumpsite was completed in 1996 on Beaufort's Dyke (FRS, 1996). This showed no evidence of munitions related chemicals in sediments, fish or shellfish. Associated naturally occurring substances such as arsenic and heavy metals were within the range occurring in samples from areas around the United Kingdom.

With the entry into force of the Oslo Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft in 1974, the dumping of munitions ceased in the Convention Area. The vast majority of munitions were dumped immediately after World War II and the problem of dumped munitions is an inherited one. With the passing of time, munitions are disintegrating on or in the seabed and the majority of warfare agents are degrading or dispersing, thus reducing the potential to cause damage. However, with the increasing demand on marine services and space, relatively new activities such as offshore wind farms and changes in fishing practices could disturb hitherto undisturbed munitions and alter this gradual process resulting in increased environmental and/or safety risks. It is essential therefore that all marine related activities consider the potential risks from dumped conventional and chemical munitions. The location of known dumpsites can assist this process and activities planned in, or close to, such dumpsites should be subject to a dumped munitions risk assessment.

Beddington and Kinloch (2005), in reviewing the literature on the key question as to whether to leave munitions dumpsites undisturbed or to carry out remedial work on them, stated that the literature overwhelmingly recommends that munitions dumpsites, both chemical and conventional, should remain undisturbed (FRS, 1996). However, ongoing developments using remote control techniques to manipulate munitions underwater, UV treatment to neutralise warfare agents and using bubble curtains to minimise the effects of explosions are showing promise (NABU, 2007).

➥*Go to full QSR assessment report on the impact of dumped conventional and chemical munitions (publication number 365/2009)*