Agenda Item 5.5

Implementation of the Triennium Work Plan (2010-2012)- Other Issues
Report of the Informal Working Group on Large Cetaceans

Document 5-04 rev.1

Large Cetaceans in the ASCOBANS Agreement Area

Action Requested

- Take note of the report and recommendations

Submitted by

Informal Working Group on Large Cetaceans

NOTE:
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF DOCUMENTS TO THE MEETING

LARGE CETACEANS IN THE ASCOBANS AGREEMENT AREA

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Nine large cetacean species have been recorded within the ASCOBANS Agreement Area (Table 1). Three of these species are either very rare or vagrant. They include the bowhead whale whose normal distribution lies outside the Agreement Area in arctic waters north of Norway and around Greenland; Bryde's whale, a tropical species that has been recorded with certainty only once - a stranding in Denmark in Sept 2000; and the North Atlantic right whale which after centuries of over-exploitation has become extremely rare in the eastern North Atlantic, with only a handful of records in the last 30 years – in Spain, Portugal, British Isles, Ireland, Norway, and Iceland. Another species, the sei whale, occurs irregularly in the region, with some indication of higher numbers in some years than others.

As with small cetaceans, our knowledge of population trends for most species within the region is poor, relying largely upon occasional offshore large-scale synoptic surveys such as the NASS, SCANS and CODA surveys (Tables 2 & 3; Hammond, 2008; Macleod & Hammond, 2008; Lockyer & Pike, 2009). This is because, with the exception of three species (minke whale, fin whale, and sperm whale), they occur in the ASCOBANS Agreement Area at too low densities for abundance surveys to derive robust population estimates using line-transect DISTANCE methodology. Furthermore, the NASS surveys were conducted mainly to the north and west of the Agreement Area (see Fig. 1), and only the two SCANS (July 1994 & July 2005) and CODA (July 2007) surveys focused upon this region (see Figs. 2-4). Thus for most species, assessment of trends in status has to rely additionally upon information on relative abundance from regional effort-based surveys, sightings and strandings.

The results of the NASS surveys between 1987 and 2001 indicate a general increase in minke whale numbers but with some re-distribution, and increases in fin whales (particularly in the Denmark Strait), humpbacks (mainly around Iceland), and sperm whale (off Norway), along with a slight increase in blue whales (around Iceland) (Lockyer & Pike, 2009). These apparent increases are most likely to be in response to much lower hunting pressure in the second half of the twentieth century. Within the main ASCOBANS Agreement Area, a combination of evidence suggests that increases have been taking place for humpback and minke whale since the 1980s (Evans, 1980, 1992; Hammond *et al*., 1995; Berrow & Rogan, 1997; Evans *et al*., 2003; Camphuysen & Peet, 2006; Camphuysen, 2007; Hammond, 2008; Berrow *et al*., 2010; Kinze *et al*., 2011). Both strandings and sightings of sperm whales around the British Isles and Ireland have also increased during the last 20 years compared with the 1970s and 1980s (Berrow *et al*., 1993; Evans, 1997; Evans *et al*., 2003; Jepson, 2005; Deaville & Jepson, 2010).

Strandings schemes within the ASCOBANS Agreement Area have thrown light on causes of death from post-mortem examinations of freshly dead cetaceans over the last twenty years. Most information comes from small cetaceans since many more strand than for large cetaceans. However, there is some limited information for particular species, notably minke, fin, humpback and sperm whale (Table 6).

The most common causes of mortality identified from post-mortem examinations of large cetaceans have been entanglement in fishing gear and vessel strike, with minke whale particularly affected by the former and fin whale by the latter. In a UK study, it was found that 17 (38%) of 44 stranded baleen whales were known or inferred cases of entanglement, and where identified, these had usually been entangled in creel lines and other ropes (Northridge *et al*., 2010). Most of the entanglements occurred in Scotland and involved minke whales, but there were also a number of humpback whales, and one sei whale. In 16 cases (53%) of 30 post mortem examinations of baleen whales, the cause of death was thought probably (2) or actually (14) to have been due to entanglement (Northridge *et al*., 2010). In the Northwest Atlantic, large whales also suffer significant mortality from entanglement in fishing gear (Lien, 1994), with the North Atlantic right whale being particularly endangered (Johnson *et al*., 2007).

The other major source of mortality for large whales in the ASCOBANS Agreement Area is vessel strike. Since 1990, the UK has been undertaking regular post mortem studies of cetaceans stranding around the British Isles under the Cetacean Strandings Investigation Programme (CSIP). Causes of mortality have been assessed, resulting in estimates of the proportions of post mortem examinations that can be attributed to physical trauma. This excludes animals showing signs of physical damage attributable to either bottlenose dolphin attack or by-catch. However, it includes cases of physical trauma of unknown origin and some of these could belong to one or other of those categories. The results indicate that between 10-20% of baleen whales examined at post mortem have suffered mortality from physical trauma, with fin whale apparently being the worst affected (20%), followed by minke whale (12%). Elsewhere in the Agreement Area, there have been cases of vessel strike affecting also humpback whale and sperm whale (Evans *et al*., 2011). Problems of vessel strike for large cetaceans are well known elsewhere (see, for example, Pesante *et al*., 2002; Panigada *et al*., 2006 – Mediterranean Sea; Knowlton & Brown, 2007; Glass *et al*., 2008; Vanderlaan *et al*., 2008 – Northwest Atlantic).

Starvation has been recorded as a cause of death in the minke whale and humpback whale (Table 6). It may also involve other species that have not been fully examined post-mortem, such as sperm whale and fin whale. Ephemeral concentrations of high-energy yielding fish such as herring, sprat and sandeel may attract baleen whales such as fin or humpback into coastal waters, and when food disperses, this may leave them vulnerable to starvation. Similarly, when male sperm whales move northwards into high latitudes, there is speculation that they may experience cephalopod food shortages leading to live stranding (Jacques & Lambertsen, 1997).

Live stranding involving large cetaceans has occurred in a few species: sperm whales in particular, but also minke whale and sei whale. The reasons that one or more whales live strand are rarely known.

Generally, baleen whales have relatively low persistent pollutant loads compared with toothed whales and dolphins, in part due to their large size, more pelagic habit, and diet that includes organisms lower down in the food chain (Aguilar *et al*., 1999). Within the ASCOBANS Agreement Area, there has been very little analysis of pollutant levels in large cetaceans.

As with small cetaceans, it should be noted that some causes of death are much easier to establish than others. By-catch, for example, can be more readily diagnosed than the effects of high pollutant loads or noise disturbance. Comparative levels of various human activities that are known to impact upon cetaceans are indicated by region in Table 7, with recent trends summarised in Table 7 (drawn largely from OSPAR's Quality Status Review, 2010, and for the Baltic, from HELCOM's Biodiversity Review, 2009). In consulting this table, note that the presence of a particular human activity or an increasing trend in that activity does not necessarily imply that it is impacting upon cetaceans. Tables 7 and 8 are included here principally to serve as warning beacons.

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Table 1. List of 9 European Cetacean Species and their overall status in the ASCOBANS Agreement Area

ORDER CETACEA		
SUB-ORDER MYSTICETI, the Baleen Whales		
Family Balaenidae (right whales)		
Balaena mysticetus	Bowhead whale	RAR (Norway only)
Eubalaena glacialis	North Atlantic right whale	VAG
Family Balaenopteridae (rorquals)		
Balaenoptera acutorostrata	Minke whale	REG/COM
B. borealis	Sei whale	RAR
B. edeni	Bryde's whale	VAG
B. musculus	Blue whale	RAR
B. physalus	Fin whale	REG/VAG
Megaptera novaeangliae	Humpback whale	RAR/VAG
SUB-ORDER ODONTOCETI, the Toothed Whales		
Family Physeteridae		
Physeter macrocephalus	Sperm whale	REG/RAR

COM = Common; REG = Regular (but uncommon); RAR = Rare; VAG = Vagrant

Table 2. Abundance estimates from SCANS-II (2005) and CODA (2007) surveys (courtesy of P.S. Hammond)

	SCANS-II				CODA				Total			
	N	**CV**	**lower 95%**	**upper 95%**	**N**	**CV**	**lower 95%**	**upper 95%**	**N**	**CV**	**lower 95%**	**upper 95%**
Minke whale	18,599	0.34	9,700	35,600	6,765 [+]	0.99	1,300	34,200	25,364	0.36	12,700	50,600
Fin whale					9,019 *	0.11	7,300	11,200	9,019	0.11	7,300	11,200
Sperm whale					2,077 *	0.20	1,400	3,100	2,077	0.20	1,400	3,100

* indicates a model-based estimate (chosen because of lower CV than the equivalent design-based estimate). All others are design-based estimates.

[+] indicates the estimate is uncorrected for animals missed on the track line and is therefore negatively biased in this respect.

The estimate for sperm whales is very likely underestimated because the correction for animals missed on the transect line is unlikely to take account of all the bias.

The estimate for fin whales is underestimated because it does not take account of the large number of sightings of large baleen whales unidentified to species, most of which are likely to be fin whales.

CVs of totals for minke whale do not include additional variance (process error) and are therefore underestimated.

Table 3. Status of knowledge on population size & trends for the nine large cetacean species occurring in the ASCOBANS Agreement Area

Species	Popn Size	Popn Trend
Bowhead whale	+*	-
North Atlantic right whale	-	-
Minke whale	++	++
Sei whale	-	-
Bryde's whale	-	-
Blue whale	+	-
Fin whale	++	+
Humpback whale	++	+
Sperm whale	+	-

Level of information across the region: - = none; + = poor; ++ = fair; +++ = good
Red = none; Amber = poor; Gold = fair; Green = good
* Population size estimate applies to the Barents Sea
(bowhead whale very rarely enters ASCOBANS Agreement Area)

Table 4. Status trends (1990-2010) by country for the nine large cetacean species occurring in the ASCOBANS Agreement Area

Species	NO	DK	SE	FI	PO	LI	DE	NL	BE	UK	IE	FR	ES	PT
Bowhead whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
North Atlantic right whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Minke whale	↑?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	↑?	↑?	?	?	?
Sei whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Bryde's whale	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Blue whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?
Fin whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Humpback whale	?	↑?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	↑?	↑?	n/a	n/a	n/a
Sperm whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?

NO Norway; DK Denmark; SE Sweden; FI Finland; PO Poland; LI Lithuania; DE Germany; NL Netherlands; BE Belgium; UK United Kingdom; IE Ireland; FR France; ES Spain; PT Portugal
↑ = increase; ↓ = decline; '?' = unknown; - = no apparent change; n/a = not applicable (rare or absent)
Red = decline; Amber = uncertain or no apparent change; Green = increase; Blue = unknown

Table 5. Status trends (1990-2010) by region for the 9 large cetacean species occurring in the ASCOBANS Agreement Area

Species	Northern East Atlantic	Central East Atlantic	Bay of Biscay	N. North Sea	Inner Danish Waters	Baltic Sea	S. North Sea	English Channel	Irish Sea
Bowhead whale	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
North Atlantic right whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a
Minke whale	↑?	↑?	?	?	n/a	n/a	n/a	n/a	n/a
Sei whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a
Bryde's whale	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Blue whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a
Fin whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a
Humpback whale	?	n/a	n/a	↑?	↑?	n/a	n/a	n/a	n/a
Sperm whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a

↑ = increase; ↓ = decline; '?' = unknown; - = no apparent change; n/a = not applicable (rare or absent)
Red = decline; Amber = uncertain or no apparent change; Green = increase; Blue = unknown

Table 6. Assessment of causes of mortality for large cetaceans in the ASCOBANS Agreement Area

Species	Infectious disease	By-catch	Ship strike	Hunting	Starvation	Gas Embolism	Live stranding
Bowhead whale	n/a	n/a	n/a	n/a	n/a	n/a	n/a
North Atlantic right whale	?*	?*	?*	-	n/a	n/a	n/a
Minke whale	?	+++	++	+	+	-	+
Sei whale	?	+	?	-	-	-	+
Bryde's whale	n/a	n/a	n/a	-	n/a	n/a	n/a
Blue whale	n/a	n/a	n/a	-	n/a	n/a	n/a
Fin whale	?	++	+++	-	-	-	-
Humpback whale	?	++	+	-	+	-	-
Sperm whale	?	+	+	-	-	-	+

- = not recorded; ? = uncertain; + = low; ++ = moderate; +++ = high importance
Red = known high importance; Amber = known medium importance; Gold = recorded in region
n/a = not applicable (i.e no data)
Note: no dead right whales have been examined in the Agreement Area over the last 20 years, but ship strike and by-catch have been identified as major sources of mortality in the NW Atlantic, and biotoxins can also be a problem (Kraus & Rolland, 2007)

Table 7. Human Activities in the ASCOBANS Agreement Area known to affect Large Cetaceans

Human Activity	Northern East Atlantic	Central East Atlantic	Bay of Biscay	N. North Sea	Inner Danish Waters	Baltic Sea	S. North Sea	English Channel	Irish Sea
Hunting	+	-	-	-	-	-	-	-	-
Fisheries – direct	+++	++	++	++	++	++	+++	+	+
Fisheries - indirect	++	++	++	+++	++	++	++	+	+
Pollution	+	+	++	++	++	+++	+++	++	++
Climate change	++	++	++	++	++	++	+++	++	++
Ship traffic	+	+++	+++	++	+++	+++	+++	+++	++
Pile driving	+	+	+	++	++	++	+++	++	+++
Seismic exploration	++	++	+	++	-	+	++	+	++
Military sonar	++	++	+	++	-	-	-	++	+
Recreational	+	+	+	+	+++	+++	+++	+++	+++
Habitat change	+	+	+	++	+	+	++	++	++

- = no activity; + = low; ++ = medium; +++ = high activity
Red = high; Amber = medium; Gold = low; Green = no activity

Table 8. Trends in the ASCOBANS Agreement Area of Human Activities known to affect Large Cetaceans

Human Activity	Northern East Atlantic	Central East Atlantic	Bay of Biscay	N. North Sea	Inner Danish Waters	Baltic Sea	S. North Sea	English Channel	Irish Sea
Hunting	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fisheries – direct	↑?	↓?	-?	↓	↓?	↓?	↑	↓	↓
Fisheries - indirect	↓	↓	↓?	↓	↓?	↓?	↑?	↓	↓
Pollution	-	-	-	-	-	↓	-	-	-?
Climate change	-**	-**	-**	↑	↑	↑	↑	↑	↑
Ship traffic	↑?	↑	↑	↑	↑	↑	↑	↑	↑?
Pile driving	-	-	-	↑	↑	↑	↑	-	↑
Seismic exploration	↓	↓	-	↓	n/a	↓	↓	↓	↓
Military sonar	-?	-?	-?	-?	n/a	n/a	n/a	n/a	-?
Recreational	↑?	↑?	↑	↑?	↑	↑	↑	↑	↑
Habitat change	-	-	-	↑	↑?	↑?	↑	↑	-?

↑ = increase; ↓ = decline; '?' = uncertain; - = no apparent change; n/a = not applicable (rare or absent)
Red = increase; Amber = uncertain or no apparent change; Gold = decrease
** small increase in sea surface temperatures

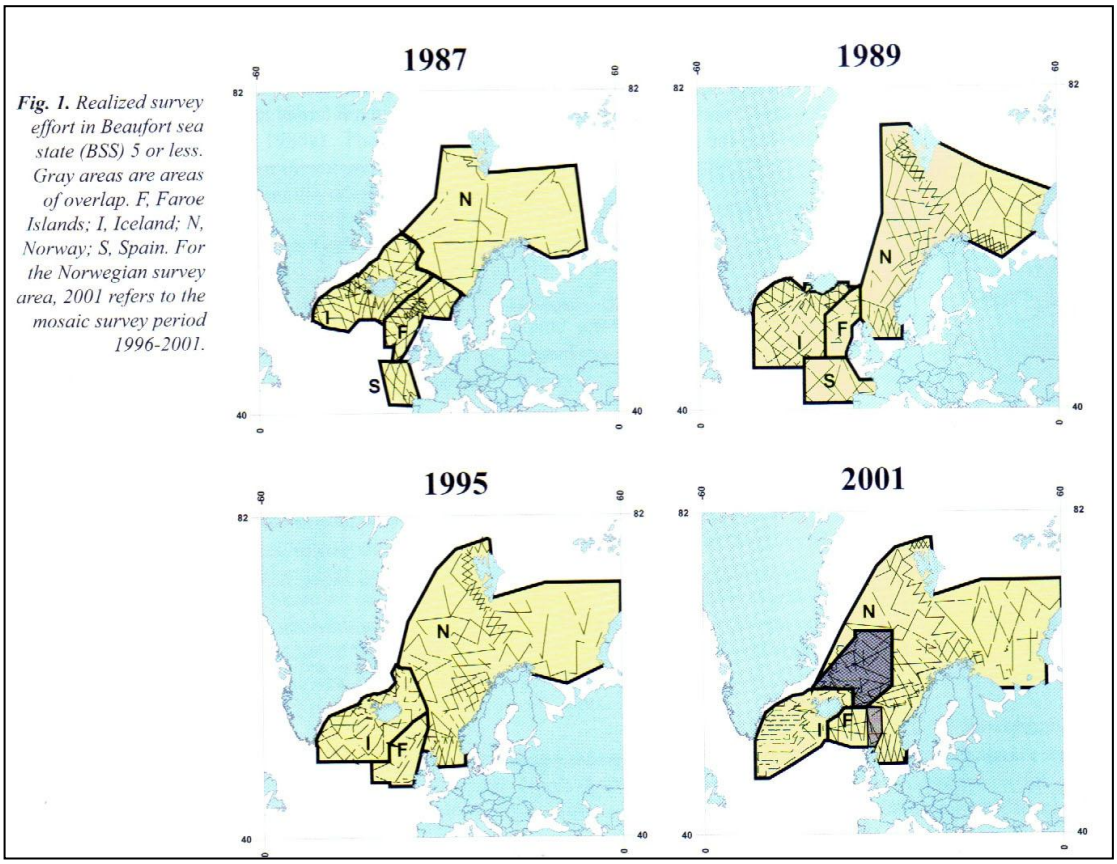

Fig. 1. *Realized survey effort in Beaufort sea state (BSS) 5 or less. Gray areas are areas of overlap. F, Faroe Islands; I, Iceland; N, Norway; S, Spain. For the Norwegian survey area, 2001 refers to the mosaic survey period 1996-2001.*

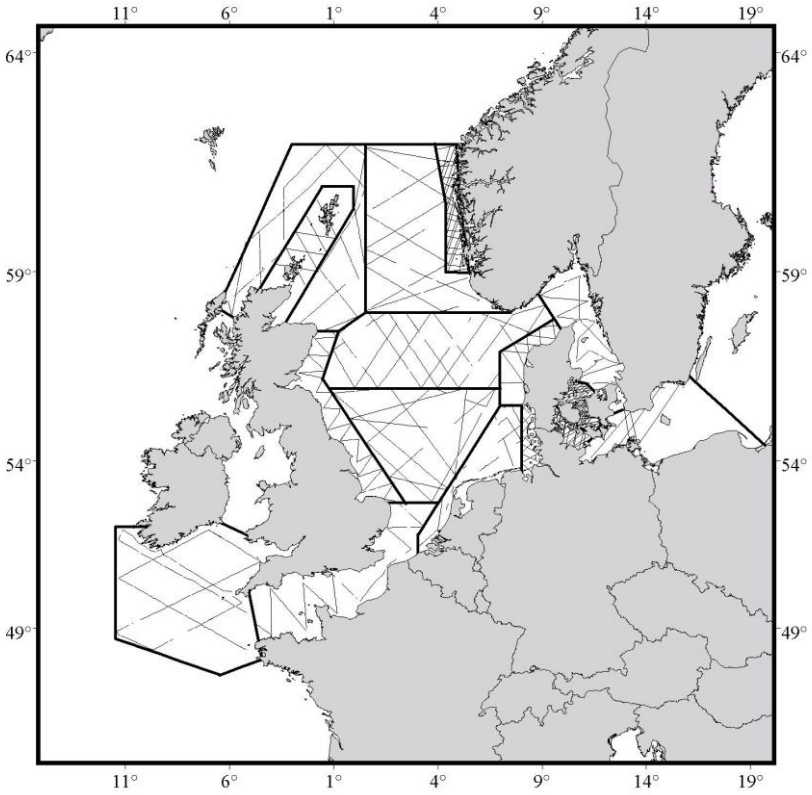

Fig. 2. *Survey Area for SCANS, July 1994*

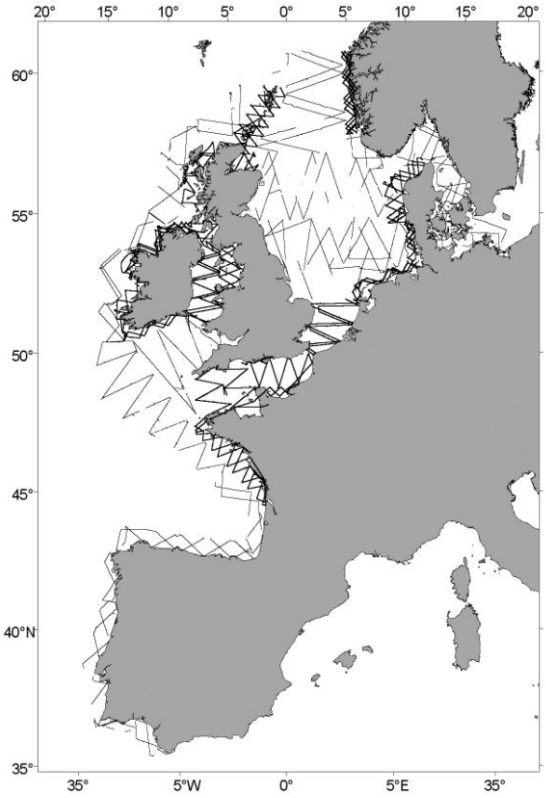

Fig. 3. *Survey Area for SCANS 2, July 2005*

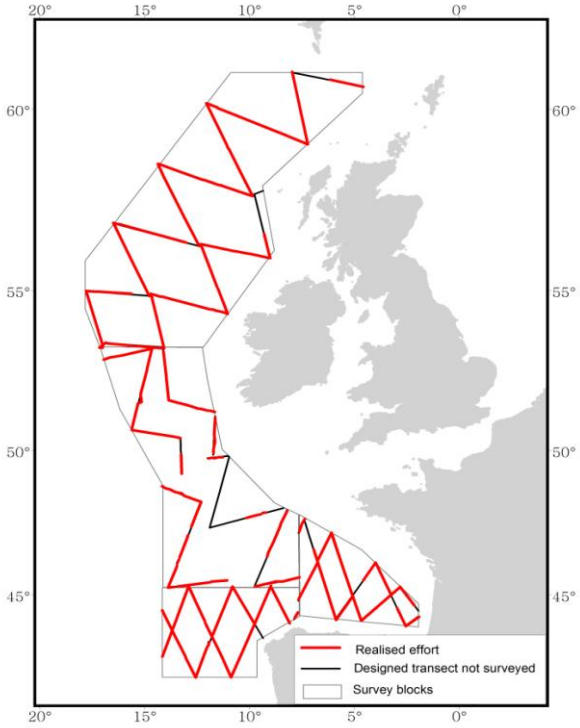

***Fig. 4**. Survey Area for CODA, July 2007*