

Agenda Item 6.1

Project Funding through ASCOBANS  
Progress of Supported Projects

Document 6-05

**Project Report:  
Review of Trend Analyses in the  
ASCOBANS Area**

**Action Requested**

- Take note of the report

Submitted by

Secretariat / Sea Watch Foundation



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



## **CETACEAN TREND ANALYSIS SUMMARY FOR THE ASCOBANS AGREEMENT AREA**

**Peter G.H. Evans<sup>1,2</sup>**

<sup>1</sup> Sea Watch Foundation, Ewyn y Don, Bull Bay, Amlwch, Isle of Anglesey LL68 9SD, Wales, UK

<sup>2</sup> School of Ocean Sciences, University of Bangor, Menai Bridge, Isle of Anglesey LL59 5AB, Wales, UK

Thirty-five cetacean species have been recorded within the ASCOBANS Agreement Area. Of these, twenty-six species are small cetaceans within the sub-order Odontoceti for which the Agreement currently applies. A list of all species, together with their overall status, is given in Table 1. Seventeen species occur regularly, of which twelve are small cetaceans (marked in bold).

Although we have some idea of their relative status, our knowledge of population sizes and trends for almost all species within the region is very poor (Tables 2 & 3; Hammond, 2008; Evans, 2010). This is either because their main distribution is offshore - beyond areas adequately surveyed, or they occur at too low densities for large synoptic abundance surveys such as SCANS, CODA and NASS to derive robust population estimates using line-transect DISTANCE methodology. 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.

Over the twenty-year period 1990-2010, status changes have been observed in a number of species of small cetaceans. These are indicated by country in Table 4, and by region in Table 5. In some cases, the observed trend remains uncertain, usually because the species has been absent in the country/region, and has only recently been recorded. Examples include records of short-beaked common, striped and Risso's dolphins in Danish waters and the Baltic. However, these are in accordance with increased sightings and strandings in adjacent areas (northern North Sea). These range extensions probably relate to oceanographic changes that have been observed in the region over the last decade or two, and have been shown to influence plankton, cephalopod, fish and seabird faunas.

Strandings schemes within the ASCOBANS Agreement Area have thrown light on causes of death from post-mortem examinations (PMEs) of freshly dead cetaceans over the last twenty years. These are summarised in Table 6 for the twelve small cetacean species regularly occurring in the region. Sample sizes are greatest for harbour porpoise and short-beaked common dolphin, and so our knowledge of major causes of mortality is best for these two species. For harbour porpoise, these have been particularly by-catch, infectious disease and, in areas where the species is sympatric with bottlenose dolphin populations, kills by the latter species. Trends in by-catch show declines in the British Isles but possible increases in Belgium and the Netherlands over the last decade. These trends are probably a combination of reduced fishing effort in the case of the UK, and geographical shifts in porpoises possibly interacting with increased fishing effort in the case of the southernmost North Sea.

For common dolphin, the most common cause of death has been by-catch, followed by live stranding, although proportions of by-catch amongst PME's have generally declined.

Although starvation as a cause of death represents a small percentage of porpoise PME's, this has been steadily increasing at least in the UK. It has also been recorded in most other species. Reductions in stocks of high-energy yielding fish such as sandeel and sprat may play a role, and could account for species such as gobies increasingly forming a significant part of porpoise diet in some regions.

In addition to harbour porpoise and common dolphin, most cetacean species have suffered by-catch, although the pelagic species, striped dolphin and Atlantic white-sided dolphin, appear to be affected more than others.

High pollutant loads (e.g. PCBs) have been implicated in porpoises that have died of infectious disease. Bottlenose dolphins and killer whales may also be particularly vulnerable since recorded PCB levels tend to be markedly higher than in other species.

Evidence from the UK strandings scheme suggests that somewhere between 4 and 6% of PME's can be attributed to physical trauma in a number of small cetacean species. These take the form of either blunt trauma from vessel strike or propeller cuts, although some may be undiagnosed cases of by-catch or bottlenose dolphin kills.

Live stranding is not uncommon in several species, though mainly ones that normally live in deep waters far offshore, such as common dolphin, Atlantic white-sided dolphin, long-finned pilot whale and Cuvier's beaked whale. Although mass-strandings of beaked whales of the family Ziphiidae have been linked to use of mid-frequency active sonar by the military in various parts of the world, no firm connection has been made within the ASCOBANS region. Chronic gas embolisms have been recorded in a few cetacean species, mainly those known to dive deeply.

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.

Our understanding of population trends and their relationship with potential causes of death or reduced birth rates is extremely poor for most cetacean species covered by the ASCOBANS Agreement. Indeed, it is reasonable only for the most common and widely distributed species, the harbour porpoise. Even for porpoises, since most available life history information derives from strandings, there are potential biases in data on mortality

and pregnancy rates. In particular, the latter may be underestimated due to the low representation of “healthy” females among stranded porpoises.

There are major challenges to overcome before such information can be adequately obtained for many small cetacean species, but those where this is feasible include bottlenose dolphin, white-beaked dolphin, Atlantic white-sided dolphin, Risso’s dolphin, short-beaked common dolphin, striped dolphin, long-finned pilot whale and killer whale.

### **Acknowledgements**

I would like to thank the following for reviewing various sections of this summary: Simon Berrow, Kees Camphuysen, Olivier van Canneyt, Rob Deaville, Phil Hammond, Jan Haelters, Paul Jepson, Carl Kinze, Santiago Lens, Graham Pierce, Vincent Ridoux, Chris Smeenk, and Ursula Siebert. I thank Phil Hammond also for kindly providing the final results of SCANS II and CODA surveys.

### **References**

Evans, P.G.H. (2010) Review of Trend Analyses in the ASCOBANS Area. ASCOBANS AC17/Doc. 6-08 (S). 68pp.

Hammond P.S. (2008) *Small cetaceans in the European Atlantic and North Sea (SCANS II)*. Sea Mammal Research Unit, St Andrews. Final report to the European Commission under contract LIFE04NAT/GB/000245.

HELCOM (2009) *Biodiversity in the Baltic Sea – an integrated thematic assessment on biodiversity and nature conservation in the Baltic Sea*. Balt. Sea Environ. Proc. No. 116B: 188pp.

OSPAR (2010) *Quality Status Report 2010*. OSPAR Commission, London. 176pp.

**Table 1.** List of 35 European Cetacean Species and their overall status in the ASCOBANS Agreement Area

<b>ORDER CETACEA</b>		
<b>SUB-ORDER MYSTICETI, the Baleen Whales</b>		
<b>Family Balaenidae (right whales)</b>		
<i>Balaena mysticetus</i>	Bowhead whale	RAR (Norway only)
<i>Eubalaena glacialis</i>	North Atlantic right whale	VAG
<b>Family Balaenopteridae (rorquals)</b>		
<i>Balaenoptera acutorostrata</i>	Minke whale	REG/COM
<i>B. borealis</i>	Sei whale	RAR
<i>B. edeni</i>	Bryde's whale	VAG
<i>B. musculus</i>	Blue whale	RAR
<i>B. physalus</i>	Fin whale	REG/VAG
<i>Megaptera novaeangliae</i>	Humpback whale	RAR/VAG
<b>SUB-ORDER ODONTOCETI, the Toothed Whales</b>		
<b>Family Physeteridae</b>		
<i>Physeter macrocephalus</i>	Sperm whale	REG/RAR
<b>Family Kogiidae</b>		
<i>Kogia breviceps</i>	Pygmy sperm whale	VAG/RAR
<i>K. sima</i>	Dwarf sperm whale	VAG
<b>Family Ziphiidae</b>		
<i>Hyperoodon ampullatus</i>	<b>Northern bottlenose whale</b>	REG/VAG
<i>M. bidens</i>	<b>Sowerby's beaked whale</b>	RAR/VAG
<i>M. densirostris</i>	Blainville's beaked whale	VAG
<i>M. europaeus</i>	Gervais' beaked whale	VAG
<i>M. grayi</i>	Gray's beaked whale	VAG
<i>M. mirus</i>	True's beaked whale	VAG
<i>Ziphius cavirostris</i>	<b>Cuvier's beaked whale</b>	REG/VAG
<b>Family Monodontidae</b>		
<i>Delphinapterus leucas</i>	White whale, beluga	VAG (RAR, Norway)
<i>Monodon monoceros</i>	Narwhal	VAG (RAR, Norway)
<b>Family Delphinidae</b>		
<i>Delphinus delphis</i>	<b>Short-beaked common dolphin</b>	COM/VAG
<i>Feresa attenuata</i>	Pygmy killer whale	VAG
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	VAG
<i>G. melas</i>	<b>Long-finned pilot whale</b>	COM/ (VAG, S. North Sea)
<i>Grampus griseus</i>	<b>Risso's dolphin</b>	REG/VAG
<i>Lagenodelphis hosei</i>	Fraser's dolphin	VAG
<i>Lagenorhynchus acutus</i>	<b>Atlantic white-sided dolphin</b>	COM/VAG
<i>L. albirostris</i>	<b>White-beaked dolphin</b>	COM/VAG
<i>Orcinus orca</i>	<b>Killer whale</b>	REG/VAG
<i>Peponocephala electra</i>	Melon-headed whale	VAG
<i>Pseudorca crassidens</i>	False killer whale	RAR/VAG
<i>Stenella coeruleoalba</i>	<b>Striped dolphin</b>	COM/VAG
<i>S. frontalis</i>	Atlantic spotted dolphin	VAG
<i>Tursiops truncatus</i>	<b>Common bottlenose dolphin</b>	COM/RAR
<b>Family Phocoenidae (porpoises)</b>		
<i>Phocoena phocoena</i>	<b>Harbour porpoise</b>	COM/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%
Harbour porpoise	385,617	0.20	261,600	568,500					385,617	0.20	261,600	568,500
White-beaked dolphin	16,787	0.26	10,200	27,700					16,787	0.26	10,169	27,700
Minke whale	18,599	0.34	9,700	35,600	6,765 <sup>+</sup>	0.99	1,300	34,200	25,364	0.36	12,700	50,600
Bottlenose dolphin	12,645 <sup>+</sup>	0.27	7,500	21,300	19,295 <sup>+</sup>	0.25	11,900	31,300	31,940	0.19	22,300	45,800
Common dolphin	50,507	0.29	28,900	88,200	116,709 <sup>*</sup>	0.34	61,400	221,800	167,216	0.25	103,000	271,300
Striped dolphin					67,414 <sup>*</sup>	0.38	32,800	138,500	67,414	0.38	32,800	138,500
Long-finned pilot whale					25,101	0.33	13,400	47,100	25,101	0.33	13,400	47,100
Fin whale					9,019 <sup>*</sup>	0.11	7,300	11,200	9,019	0.11	7,300	11,200
Sperm whale					2,077 <sup>*</sup>	0.20	1,400	3,100	2,077	0.20	1,400	3,100
Beaked whales					6,992 <sup>+</sup>	0.25	4,300	11,300	6,992	0.25	4,300	11,300

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

<sup>+</sup> 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, bottlenose and common dolphin do not include additional variance (process error) and are therefore underestimated.

**Table 3.** Status of knowledge on population size & trends for the 12 small cetacean species regularly occurring in the ASCOBANS Agreement Area

Species	Popn Size	Popn Trend
Northern bottlenose whale	+	-
Sowerby's beaked whale	-	-
Cuvier's beaked whale	-	-
Short-beaked common dolphin	++	-
Long-finned pilot whale	+	-
Risso's dolphin	-	-
Atlantic white-sided dolphin	+	-
White-beaked dolphin	++	+
Killer whale	-	-
Striped dolphin	+	-
Bottlenose dolphin	++	++
Harbour porpoise	+++ -	+++ -

Level of information across the region: - = none; + = poor; ++ = fair; +++ = good  
 Red = none; Amber = poor; Gold = fair; Green = good  
 Status of knowledge for Harbour Porpoise is different for the Baltic Sea (in red) and the rest of the ASCOBANS Agreement Area (in green)

**Table 4.** Status trends (1990-2010) by country for the 12 small cetacean species occurring regularly in the ASCOBANS Agreement Area

Species	NO	DK	SE	FI	PO	LI	DE	NL	BE	U K	IE	FR	ES	PT
Northern bottlenose whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Sowerby's beaked whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Cuvier's beaked whale	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	↑?	?	?	?	?
Short-beaked common dolphin	↑?	↑?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	↑	-	?
Long-finned pilot whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	-	?	?
Risso's dolphin	n/a	↑?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Atlantic white-sided dolphin	?	↑?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	↓?	?	n/a	n/a	n/a
White-beaked dolphin	?	↑?	n/a	n/a	n/a	n/a	↓?	-	↑?	?	?	n/a	n/a	n/a
Killer whale	?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	?	?	?	?	?
Striped dolphin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	↑	↑	↑	?	?
Bottlenose dolphin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	-	↑	↑?	?
Harbour porpoise	↓?	↓?	↓?	↓?	↓?	?	?	↑	↑	-	?	↑	↑?	?

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 12 small cetacean species regularly 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
Northern bottlenose whale	?	?	?	?	n/a	n/a	n/a	n/a	n/a
Sowerby's beaked whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a
Cuvier's beaked whale	?	?	?	n/a	n/a	n/a	n/a	n/a	n/a
Short-beaked common dolphin	↑?	↑?	↑?	↑	↑?	↑?	n/a	?	?
Long-finned pilot whale	?	?	-	?	n/a	n/a	n/a	n/a	n/a
Risso's dolphin	?	?	?	↑	n/a	n/a	n/a	n/a	n/a
Atlantic white-sided dolphin	↓	n/a	n/a	↓	n/a	n/a	n/a	n/a	n/a
White-beaked dolphin	?	n/a	n/a	↓?	↑?	n/a	-?	-	n/a
Killer whale	?	?	n/a	?	n/a	n/a	n/a	?	?
Striped dolphin	↑	?	?	↑	n/a	n/a	n/a	↑	↑
Bottlenose dolphin	?	?	↑	-	n/a	n/a	n/a	-	-
Harbour porpoise	?	?	↑	↓	↓?	↓	↑	↑	↑

↑ = 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.** Causes of mortality identified from post-mortem examinations of cetaceans in the ASCOBANS Agreement Area

Species	Infectious disease	By-catch	Ship strike	Bottlenose dolphin kill	Starvation	Gas Embolism	Live stranding
Northern bottlenose whale	+	-	-	-	+	-	++
Sowerby's beaked whale	-	-	+	-	-	+	+
Cuvier's beaked whale	-	-	-	-	+	+	+
Short-beaked common dolphin	+	+++	+	-	+	+	++
Long-finned pilot whale	+	+	+	-	+	-	++
Risso's dolphin	-	+	+	-	+	+	+
Atlantic white-sided dolphin	+	++	-	-	+	-	++
White-beaked dolphin	+	-	+	-	+	-	+
Killer whale	-	-	+	-	+	-	+
Striped dolphin	+	+++	-	-	+	-	++
Bottlenose dolphin	+	+	+	+	+	-	+
Harbour porpoise	+++	+++	+	++	++	+	+

- = not recorded; + = low; ++ = moderate; +++ = high importance  
 Red = known high importance; Amber = known medium importance; Gold = recorded in region

**Table 7.** Human Activities in the ASCOBANS Agreement Area known to affect Small 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

\* no legal hunting for small cetaceans occurs within the ASCOBANS Area, but Faroese shore drives probably affect small cetacean populations from that area

**Table 8.** Trends in the ASCOBANS Agreement Area of Human Activities known to affect Small 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

\* no legal hunting for small cetaceans occurs within the ASCOBANS Area, but Faroese shore drives probably affect small cetacean populations from that area

\*\* small increase in sea surface temperatures