

UK Cetacean Strandings Investigation Programme



**Annual Report to Defra for the period
1st January – 31st December 2006 (Contract number CR0346)**



Institute of Zoology

LIVING CONSERVATION



This report results from work conducted by the collaborative UK Cetacean Strandings Investigation Programme. Partner organisations are Institute of Zoology, Zoological Society of London (ZSL), the Natural History Museum (NHM), the Scottish Agricultural College, Inverness (SAC), Marine Environmental Monitoring (MEM) and the Centre for Environment, Fisheries & Aquaculture Science (CEFAS).

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Executive summary

In 2006, 741 cetaceans were reported to the UK Cetacean Strandings Investigation Programme (CSIP), a 6% increase on the number reported in 2005. Of these, 707 were dead stranded, 17 were live-stranded and 17 were dead cetaceans found at sea. In addition, 14 UK-stranded marine turtles were reported in 2006. There were no unusual mass-mortality events of UK-stranded cetaceans or marine turtles during 2006. The most common UK-stranded cetacean species in 2006 were the harbour porpoise (*Phocoena phocoena*, n=419) and the short-beaked common dolphin (*Delphinus delphis*, n=131).

During the period of this report, 146 cetacean strandings (representing 14 species) and two marine turtle strandings were examined at post mortem using standardised protocols. The most common causes of mortality of the 102 UK-stranded harbour porpoises examined at post-mortem in 2006 were starvation (n=28, including five neonates), attack from bottlenose dolphins (*Tursiops truncatus*, n=18), pneumonias due to combinations of parasitic, bacterial and mycotic infections (n=14) and entanglement in fishing gear (by-catch) (n=11). Most cases of fatal attack from bottlenose dolphins occurred in north-east Scotland (n=8) and west Wales (n=5) where porpoises have sympatric distributions with resident bottlenose dolphin populations. Five cases were also found in the south-west of England (Cornwall).

As in previous years, by-catch was the most common cause of death in UK-stranded short-beaked common dolphins accounting for 12 of the 21 examined in 2006. The majority of short-beaked common dolphin by-catches typically stranded in south-west England (Cornwall and Devon) between January and April. Although post-mortem examinations have shown that strandings of common dolphins and harbour porpoises in south-west England in recent years were mainly a result of incidental catch in commercial fishing nets (by-catch), factors such as changes in abundance and distribution of these species and increased reporting effort in south-west England may have played a role in the increasing number of strandings of both species reported.

In 2006, tissue samples collected by the CSIP from 100 UK-stranded cetaceans were sent to the Centre for Environment, Fisheries & Aquaculture Science (CEFAS) Burnham Laboratory, Essex for toxicological analyses including the flame retardant compounds hexabromocyclododecane (HBCD) and tetrabromobisphenol A (TBBP-A).

During 2006, the final UK CSIP report to Defra for the contract period 2000-2004 was published¹ and detailed overall trends in cetacean and turtle strandings in the UK from 2000-2004 inclusive. Long-term analyses (1990-2004) of spatial and temporal trends in selected causes of mortality and exposure to environmental pollutants (mainly for UK-stranded harbour porpoises), and investigations of potential relationships between pollutant exposure and health status using statistical methods, were included. In addition, a broad range of additional collaborative research activity using data

¹ <http://www.defra.gov.uk/wildlife-countryside/resprog/findings/index.htm>

and tissues collated by the UK CSIP since 1990 were summarised within the report.

Contents

1	Executive Summary	3
2	Contents	5
3	Introduction	6
4	Materials and methods	7
5	Cetacean and marine turtle strandings around the UK coastline for the year 2006	9
6	Summary of UK-stranded cetaceans and marine turtles (2006)	
	Harbour porpoise (<i>Phocoena phocoena</i>)	12
	Short-beaked common dolphin (<i>Delphinus delphis</i>)	13
	Minke whale (<i>Balaenoptera acutorostrata</i>)	15
	Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	15
	White beaked dolphin (<i>Lagenorhynchus albirostris</i>)	15
	Pilot whale (<i>Globicephala melas</i>)	15
	Bottlenose dolphin (<i>Tursiops truncatus</i>)	15
	Sperm whale (<i>Physeter catodon</i>)	16
	Striped dolphin (<i>Stenella coeruleoalba</i>)	16
	Risso's dolphin (<i>Grampus griseus</i>)	16
	Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	16
	Humpback whale (<i>Megaptera novaeangliae</i>)	18
	Fin whale (<i>Balaenoptera physalus</i>)	19
	Sowerby's beaked whale (<i>Mesoplodon bidens</i>)	19
	Indeterminate species	20
	Marine turtles	21
7	Post mortem investigations and cause of death categories	22
8	Causes of death- spatial distributions	25
9	Trends in selected cetacean mortality 2002-2006	28
10	Collaborations and outputs	30
11	References	34
12	List of Tables and Figures	35
13	Acknowledgments	37
14	Appendix (summary of causes of death 2006)	38

Introduction

This report is based on research conducted under contract (CRO346) to the Department for Environment, Food and Rural Affairs (Defra) between 1st January and 31st December 2006. The Institute of Zoology² (IoZ), Scottish Agricultural College (SAC), Natural History Museum (NHM) and Marine Environmental Monitoring (MEM) Organisation are responsible for the delivery of this contract.

Since 1990, the collaborative UK Cetacean Strandings Investigation Programme (CSIP) has been funded by the Department of Environment (DoE, later DETR and now Defra) to;

- collate, analyse and report data for all cetacean strandings around the coast of the UK;
- determine the causes of death in stranded cetaceans, including by-catch and physical trauma; and
- undertake surveillance on the incidence of disease in stranded cetaceans in order to identify any substantial new threats to their conservation status.

The CSIP also continues to submit data on strandings and post-mortem examinations to the UK annual national report for ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas).

The organisational structure of the CSIP and the responsibilities of each organisation are given below in Figure 1.

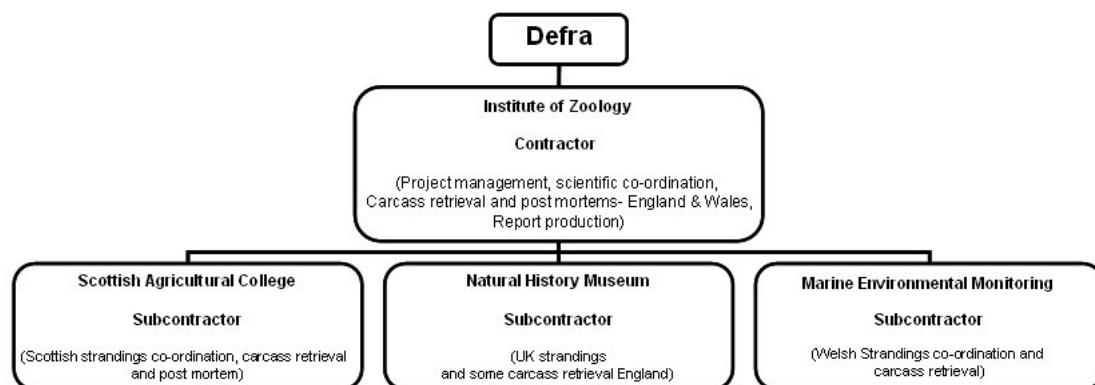


Figure 1 Organisational structure of the CSIP

² Main Contractor responsible for the delivery of CRO346

Materials and methods

Reporting and collection of cetacean and marine turtle strandings

The reporting, retrieval and transportation of marine mammal carcasses within England and Wales involves the integration of a number of localised reporting centres with the IoZ and the NHM (see below). In Scotland, the reporting, retrieval and transportation of marine mammal carcasses is co-ordinated by the SAC (Inverness). Stranding reports are verified wherever possible through the use of digital photographs taken on the beach. The decision about whether to subject a carcass to post-mortem is based on the state of decomposition and whether it can be secured safely prior to collection and transportation to a laboratory for post-mortem examination. The relevant public health considerations of handling stranded cetacean carcasses are stressed to those individuals and organisations that are involved with the day-to-day reporting and recovery of stranded carcasses.

Details of regional reporting networks (Cornwall Wildlife Trust; Devon Wildlife Trust; National Marine Aquarium, Plymouth) for cetacean and marine turtle strandings can be found at: <http://www.nhm.ac.uk/research-curation/projects/strandings/>

Post mortem examination

Carcasses were routinely transported to one of the four pathology laboratories:

- Institute of Zoology (Zoological Society of London), Regent's Park, London, NW1 4RY;
- Scottish Agricultural College (Veterinary Science Division), Drummondhill, Stratherrick Road, Inverness, Scotland, IV2 4JZ; and
- Veterinary Laboratories Agency (Truro), Polwhele, Truro, Cornwall, TR4 9AD.
- Department of Veterinary Pathology, University of Liverpool, Neston, Wirral, L69 3BX.

In cases where carcasses were too large or too difficult to retrieve, post-mortem investigations were conducted *in situ* at the stranding site. All cetacean and marine turtle post-mortem investigations (including tissue sampling) are conducted using standard procedures (Law 1994). Essentially, organs are systematically examined and routine tissue samples are collected for virological, microbiological, histopathological, toxicological and other studies. Any observed lesions are also sampled for further diagnostic tests, depending on the suspected aetiology.

Assessing causes of death

Although it is often not possible to arrive at a definitive cause of death for any individual carcass, a probable cause of death is ascribed wherever possible based on the collective findings from post-mortem and other diagnostic investigations. Criteria used to establish selected causes of death are described below:

- **A cause of death of entanglement in fishing gear (by-catch)** was ascribed to cetacean carcasses using established criteria for by-catch diagnosis (Kuiken *et al.* 1994).
- **A cause of death of fatal attack from one or more bottlenose dolphins** was established using characteristic pathological criteria (Ross & Wilson 1996, Jepson & Baker 1998)
- **Starvation** was attributed as the cause of death in animals that were severely emaciated in the absence of any other underlying disease processes that could explain the poor nutritional status (Jepson *et al* 2006).
- **Live-stranding** was attributed as the cause of death in cetaceans that were known or suspected (from post-mortem examination) to have live-stranded while in apparent good health and nutritional status. This category excluded severely diseased or emaciated animals that were suspected to have stranded alive *in extremis* and in which the cause of death was attributed to the disease process rather than the live-stranding event (Jepson *et al* 2006).

Tissue archiving

Tissue specimens collected for research and archive are stored at both -20°C and -80°C and in 10% neutral buffered formalin or 70% alcohol at the IoZ and SAC Inverness or sent to collaborating institutions for research purposes.

Cetacean and marine turtle strandings around the UK coastline for the year 2006

In 2006, 741 cetaceans were reported to the CSIP comprising 14 species (Table 1). Of these, 707 were reports of stranded dead cetaceans, 17 were of live-stranded cetaceans and 17 were of dead cetaceans found at sea. Of the 17 live-stranded cetaceans, five were successfully returned to sea. In addition, 14 UK-stranded marine turtles were also reported, comprising two species (Table 1).

The most commonly reported UK stranded cetacean species in 2006 were the harbour porpoise (*Phocoena phocoena*) (n=419) and the short-beaked common dolphin (*Delphinus delphis*) (n=131). The remaining 104 individual strandings represented 12 other species, comprising minke whale (*Balaenoptera acutorostrata*, n=18), Atlantic white-sided dolphin (*Lagenorhynchus acutus*, n=15), white beaked dolphin (*Lagenorhynchus albirostris*, n=12), long-finned pilot whale (*Globicephala melas*, n=11), bottlenose dolphin (*Tursiops truncatus*, n=11), sperm whale (*Physeter catodon*, n=10), striped dolphin (*Stenella coeruleoalba*, n=9), Risso's dolphin (*Grampus griseus*, n=5), northern bottlenose whale (*Hyperoodon ampullatus*, n=4), humpback whale (*Megaptera novaeangliae*, n=4), fin whale (*Balaenoptera physalus*, n=3) and Sowerby's beaked whale (*Mesoplodon bidens*, n=2). The spatial distribution of these strandings (by species) is given in Table 1. A number of strandings (n=87) were too decomposed, incomplete or inaccessible to enable either accurate identification or retrieval for further investigation at post mortem (Table 1).

The largest number of cetacean strandings was reported in England (n=404), with a smaller number in both Scotland (n=194) and Wales (n=131). This is a broadly similar proportion to reported strandings in each country over the previous four years (Figure 2).

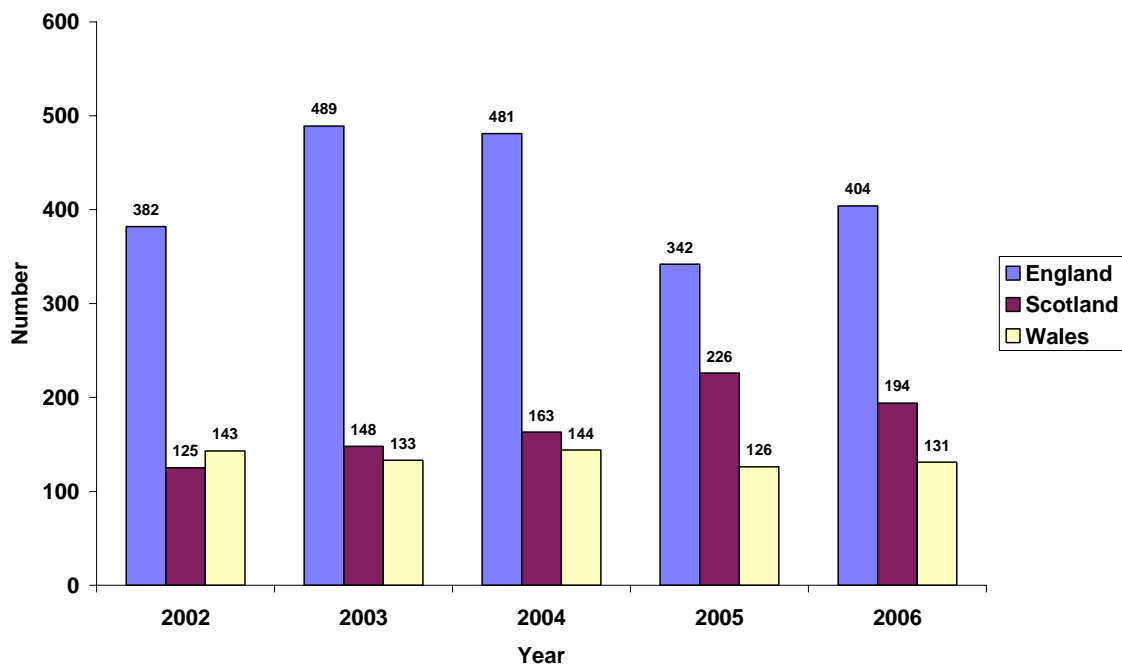


Figure 2 Reported cetacean strandings in England, Scotland and Wales 2002-2006

Table 1 Reported strandings of cetaceans and marine turtles in the UK for 2006

Species	England and Isle of Man	Scotland	Wales	Northern Ireland	Channel Islands	Unknown	Total
Harbour porpoise (<i>Phocoena phocoena</i>)	192	113	109	3	1	1	419
Short-beaked common dolphin (<i>Delphinus delphis</i>)	118	5	7	0	1	0	131
Minke whale (<i>Balaenoptera acutorostrata</i>)	5	13	0	0	0	0	18
Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	1	13	0	1	0	0	15
White beaked dolphin (<i>Lagenorhynchus albirostris</i>)	3	9	0	0	0	0	12
Long-finned pilot whale (<i>Globicephala melas</i>)	5	6	0	0	0	0	11
Bottlenose dolphin (<i>Tursiops truncatus</i>)	5	2	4	0	0	0	11
Sperm whale (<i>Physeter catodon</i>)	5	5	0	0	0	0	10
Striped dolphin (<i>Stenella coeruleoalba</i>)	4	1	3	1	0	0	9
Risso's dolphin (<i>Grampus griseus</i>)	1	4	0	0	0	0	5
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	3	1	0	0	0	0	4
Humpback whale (<i>Megaptera novaeangliae</i>)	3	1	0	0	0	0	4
Fin whale (<i>Balaenoptera physalus</i>)	2	1	0	0	0	0	3
Sowerby's beaked whale (<i>Mesoplodon bidens</i>)	1	1	0	0	0	0	2
Dolphin (indeterminate species)	25	5	0	1	0	0	31
Cetacean (indeterminate species)	20	4	7	0	0	0	31
Odontocete (indeterminate species)	8	8	1	0	1	0	18
Short beaked common/ striped dolphin (indeterminate)	2	1	0	0	0	0	3
Mysticete (indeterminate species)	1	0	0	1	0	0	2
<i>Balaenoptera</i> sp. (indeterminate)	0	0	0	1	0	0	1
<i>Lagenorhynchus</i> sp. (indeterminate)	0	1	0	0	0	0	1
Loggerhead turtle (<i>Caretta caretta</i>)	0	4	2	0	0	0	6
Leatherback turtle (<i>Dermochelys coriacea</i>)	8	0	0	0	0	0	8
TOTAL	412	198	133	8	3	1	755

Table 2 Reported strandings of cetaceans and marine turtles in the UK 2002-2006

Species	2002	2003	2004	2005	2006
Harbour porpoise (<i>Phocoena phocoena</i>)	347	321	472	444	419
Short-beaked common dolphin (<i>Delphinus delphis</i>)	119	209	159	94	131
Minke whale (<i>Balaenoptera acutorostrata</i>)	18	18	14	14	18
Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	4	12	5	9	15
White beaked dolphin (<i>Lagenorhynchus albirostris</i>)	7	5	9	8	12
Long-finned pilot whale (<i>Globicephala melas</i>)	21	5	5	19	11
Bottlenose dolphin (<i>Tursiops truncatus</i>)	6	7	8	7	11
Sperm whale (<i>Physeter catodon</i>)	4	8	3	5	10
Striped dolphin (<i>Stenella coeruleoalba</i>)	9	12	6	7	9
Risso's dolphin (<i>Grampus griseus</i>)	11	7	10	13	5
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	0	1	2	0	4
Humpback whale (<i>Megaptera novaeangliae</i>)	0	1	2	0	4
Fin whale (<i>Balaenoptera physalus</i>)	0	0	7	1	3
Sowerby's beaked whale (<i>Mesoplodon bidens</i>)	1	1	3	1	2
Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	3	1	2	3	0
Killer whale (<i>Orcinus orca</i>)	1	1	0	2	0
Pygmy sperm whale (<i>Kogia breviceps</i>)	1	0	0	0	0
Dolphin (indeterminate species)	51	114	55	38	31
Cetacean (indeterminate species)	27	25	11	17	31
Odontocete (indeterminate species)	18	24	16	12	18
Short beaked common/striped dolphin (indeterminate)	7	3	8	2	3
Mysticete (indeterminate species)	0	0	0	0	2
Balaenoptera sp. (indeterminate)	0	0	1	2	1
Lagenorhynchus sp. (indeterminate)	0	1	1	1	1
Beaked whale (indeterminate species)	0	0	0	1	0
Leatherback turtle (<i>Dermochelys coriacea</i>)	2	3	5	8	8
Loggerhead turtle (<i>Caretta caretta</i>)	6	3	2	3	6
Other turtles (Green, Kemp's Ridley, unidentified)	4	2	0	2	0
TOTALS	667	784	806	713	755

Summary of UK-stranded cetaceans and marine turtles in 2006 (by species)

Harbour porpoise (*Phocoena phocoena*)

In 2006, 419 stranded harbour porpoises were reported in the UK, a figure broadly consistent with the previous four years (Tables 1 and 2). Of these, 192 stranded in England (including the Isle of Man), 113 stranded in Scotland, 109 stranded in Wales, three stranded in Northern Ireland and one stranded in the Channel Islands (Figure 4). A single report of a stranded harbour porpoise could not be ascribed to a location. The annual number of reported harbour porpoise strandings has increased over recent years, in comparison to figures at the beginning of the period of study (Figure 3).

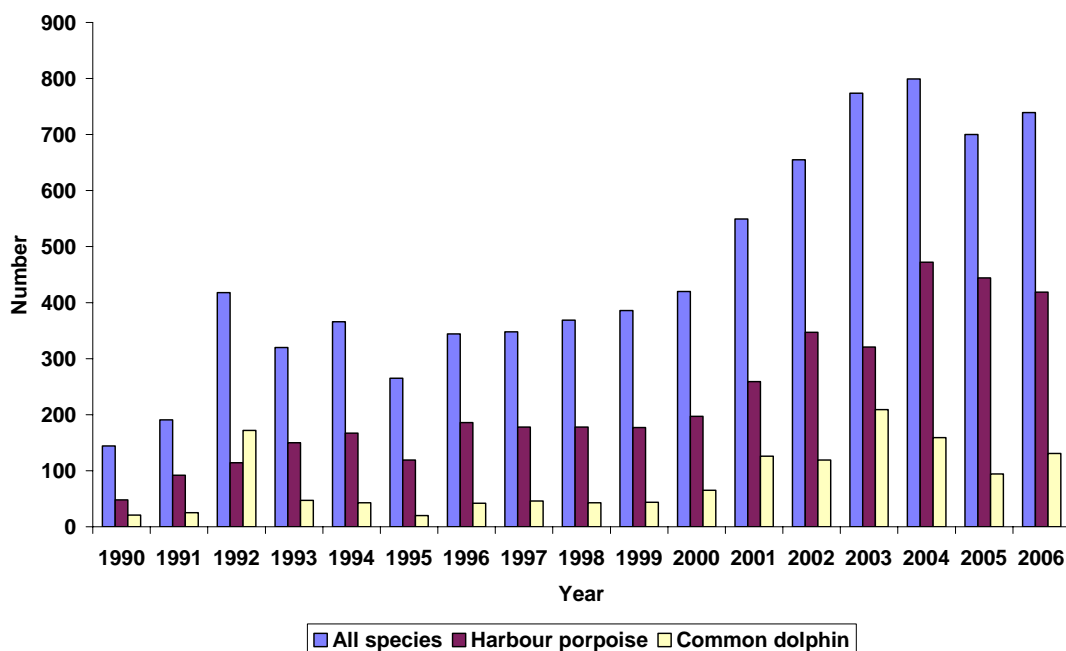


Figure 3 Annual numbers of UK stranded cetaceans, harbour porpoises and common dolphins (1990-2006)

Of the 419 reported strandings, 102 were investigated at post mortem, of which 42 were conducted in England, 36 in Scotland and 24 in Wales (Tables 3, 4, 5 and 6). A cause of death was found in 95 individuals (93% of post mortem examinations). Of these, 28 died from starvation (including five neonates), 18 died as a result of attack from one or more bottlenose dolphins, 14 died from pneumonias due to combinations of parasitic, bacterial and/or mycotic infections and 11 died following entanglement in fishing gear (by-catch). A further six porpoises died from diseases of the gastro-intestinal tract, five died as a consequence of live-stranding, five from physical trauma of unknown cause/s, four from possible boat strike/s, three of generalised bacterial/fungal infections and one of a pneumonia of unknown aetiology (Table 7).



Figure 4 Distribution of harbour porpoise strandings in England, Scotland and Wales (2006)

Short-beaked common dolphin (*Delphinus delphis*)

In 2006, 131 stranded short-beaked common dolphins were reported in the UK, a figure broadly consistent with the previous four years (Tables 1 and 2). Of these, 118 stranded in England, five in Scotland, seven in Wales and one in the Channel Islands (Figure 5). The annual number of reported common dolphin strandings in the UK has generally increased since the mid-late 1990s (Figure 3).

Of the 131 reported strandings, 21 were investigated at post mortem, of which 18 were conducted in England, two in Scotland and one in Wales (Tables 3, 4, 5 and 6). A cause of death was found in 18 individuals (86% of post mortem examinations). Of these, 12 died following entanglement in fishing gear (by-catch), three as a consequence of live-stranding, two of starvation and a single animal of physical trauma of unknown cause (Table 7).

As in previous years, strandings of common dolphins are strongly spatially and temporally explicit, with most occurring in south-west England (Figure 5) from January-April (Figure 6).



Figure 5 Distribution of short-beaked common dolphin strandings in England, Scotland and Wales (2006)

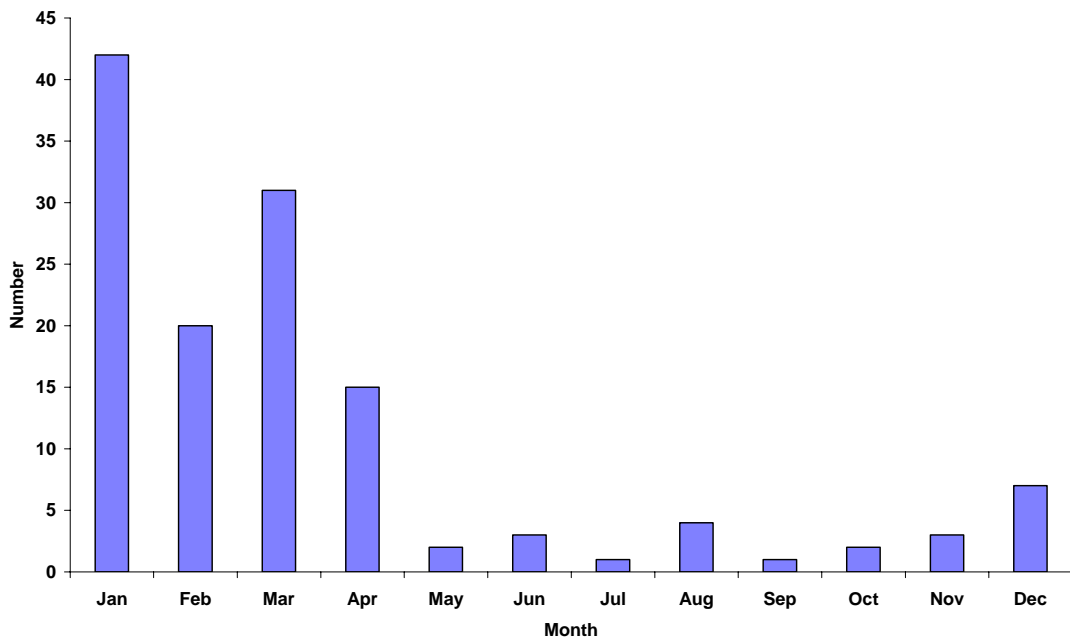


Figure 6 Monthly strandings of short-beaked common dolphins in the UK (2006)

Minke whale (*Balaenoptera acutorostrata*)

Eighteen stranded minke whales were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, 13 were found stranded in Scotland and five in England (Figure 7). Of the 18 reported strandings, a single animal from England was investigated at post mortem (Tables 3 and 4). The cause of death could not be established (Table 7).

Atlantic white-sided dolphin (*Lagenorhynchus acutus*)

Fifteen stranded Atlantic white-sided dolphins were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, 13 were found in Scotland, one was found in England, and one in Northern Ireland (Figure 8). Of the 15 reported strandings, five were investigated at post mortem (Tables 3, 4 and 5); four died as a consequence of live-stranding and one died from a liver infection with *Streptococcus equi* (Table 7).

White-beaked dolphin (*Lagenorhynchus albirostris*)

Twelve stranded white-beaked dolphins were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, nine stranded in Scotland and three stranded in England (Figure 8). Of the 12 reported strandings, three were investigated at post mortem (Tables 3, 4 and 5); one died as a result of by-catch, one from a parasitic and mycotic pneumonia and one from a disseminate fungal ear infection (Table 7).

Long-finned pilot whale (*Globicephala melas*)

Eleven stranded long-finned pilot whales were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, five stranded in England and six stranded in Scotland (Figure 8). None of the 11 reported strandings were investigated at post mortem.

Bottlenose dolphin (*Tursiops truncatus*)

Eleven stranded bottlenose dolphins were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, five stranded in England, four stranded in Wales and two stranded in Scotland (Figure 8). Of the 11 reported strandings, four were investigated at post mortem (Tables 3, 4 and 6); one died as a result of a generalised bacterial infection with *Erysipelothrix rhusiopathiae* and a cause of death could not be established in three cases (Table 7).

On 12th December 2006, the remains of a juvenile female bottlenose dolphin were found at Skinburness in Cumbria. A solitary bottlenose dolphin, nicknamed "Marra" had been regularly sighted around Maryport, Cumbria for several months in the summer and autumn of 2006 but not in the days or weeks

prior to the discovery of the carcass. On examination of the body at post mortem, several distinguishing features were found that made it highly likely to be the carcass of “Marra”.

Despite the degree of decomposition and the loss of some internal organs, it was still possible to establish a cause of death. Microbiological examination demonstrated heavy, pure or near pure isolates of *Erysipelothrix rhusiopathiae* from all tissues cultured (lung, kidney, heart blood, brain and haemorrhagic blubber lesion). It is therefore likely that this dolphin died due to peracute *Erysipelothrix rhusiopathiae* septicaemia. The bacterial organism *Erysipelothrix rhusiopathiae* has occasionally been recorded as a cause of peracute septicaemia and death in other UK-stranded cetaceans, including several harbour porpoises and a bottlenose dolphin that stranded in Kent in 1999.

Sperm whale (*Physeter catodon*)

Ten stranded sperm whales were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, five stranded in England and five stranded in Scotland (Figure 8). Of the ten reported strandings, two were investigated at post mortem (Tables 3, 4 and 6); both died as a consequence of live-stranding (Table 7).

Striped dolphin (*Stenella coeruleoalba*)

Nine stranded striped dolphins were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, four stranded in England, one in Scotland, three in Wales and one in Northern Ireland (Figure 8). Of the nine reported strandings, four were investigated at post mortem (Tables 3, 4, 5 and 6); one died as a result of entanglement in fishing gear (by-catch), one died as a consequence of live-stranding, one died from starvation and a cause of death could not be determined in one animal (Table 7).

Risso’s dolphin (*Grampus griseus*)

Five stranded Risso’s dolphins were reported in the UK in 2006, a number consistent with the previous four years (Tables 1 and 2). Of these, four stranded in Scotland and one stranded in England (Figure 8). None of the five reported strandings were investigated at post mortem.

Northern bottlenose whale (*Hyperoodon ampullatus*)

Four stranded northern bottlenose whales were reported in the UK in 2006 (Tables 1 and 2). Of these, three stranded in England and one stranded in Scotland (Figure 8). All four were investigated at post mortem (Tables 3, 4 and 5); three died as a consequence of live-stranding and one died as a result of a fungal encephalitis (Table 7).

One of the four northern bottlenose whales was a juvenile female that was first sighted swimming in the river Thames in central London on 19th January 2006. The whale subsequently became an international news story as a stranding response was initiated by members of British Divers Marine Life Rescue (BDMLR) assisted by staff of the CSIP (ZSL, MEM and NHM), the Port of London Authority, and the Metropolitan River Police.



Plate 1 Northern bottlenose whale swimming in the Thames 19th January 2006 (Photo by R. Deaville, ZSL)

After the first sighting in the Thames on the 19th, a complex attempt to translocate the whale back out into the Thames Estuary was undertaken on 21st January but the animal unfortunately died in the Thames Estuary later the same day. Blood samples taken within one hour of the animal being hoisted onto the barge “Crossness” (and approximately 3¼ hours before death) subsequently indicated moderate-severe dehydration, renal failure, some muscle damage, and possibly a mild degree of anaemia.

A full post mortem examination took place on 22nd January. Ultimately, it is likely that a combination of pre-existing dehydration, followed by physiological stress and the effects of bodyweight induced by stranding and the rescue attempt lead to cardiovascular collapse, respiratory impairment, multi-organ ischemia, skeletal and myocardial muscle damage and renal failure eventually resulting in multiple organ failure and death.

The “Thames whale” stranding event generated intense media scrutiny across the world. On 25th January 2006, ZSL organised a press conference with the various organisations involved in the rescue attempt to report the initial findings from the post-mortem examination. In addition, the skeleton of the whale is currently held in the National Collection of Mammals (Cetacea Collection) at the NHM to enable wider scientific study.



Plate 2 Post mortem examination of the Thames whale conducted by CSIP staff on 22nd January 2006 (copyright R. Penrose, Marine Environmental Monitoring)

Humpback whale (*Megaptera novaeangliae*)

Four stranded humpback whales were reported in the UK in 2006 (Tables 1 and 2). Of these, three stranded in England and one stranded in Scotland (Figure 7). None of the four reported strandings were investigated at post mortem.

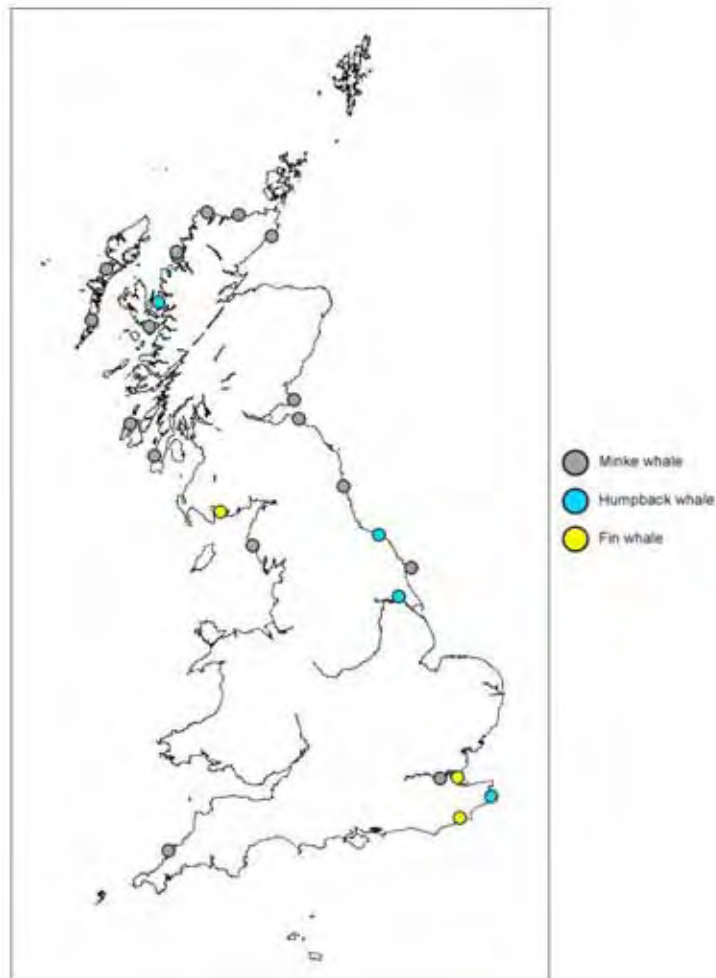


Figure 7 Distribution of mysticete strandings in England, Scotland and Wales (2006)

Fin whale (*Balaenoptera physalus*)

Three stranded fin whales were reported in the UK in 2006 (Tables 1 and 2). Of these, two stranded in England and one stranded in Scotland (Figure 7). None of the four reported strandings were investigated at post mortem.

Sowerby's beaked whale (*Mesoplodon bidens*)

A single stranded Sowerby's beaked whale was reported in England in 2006. (Tables 1 and 2 and Figure 8). The stranding was not investigated at post mortem.

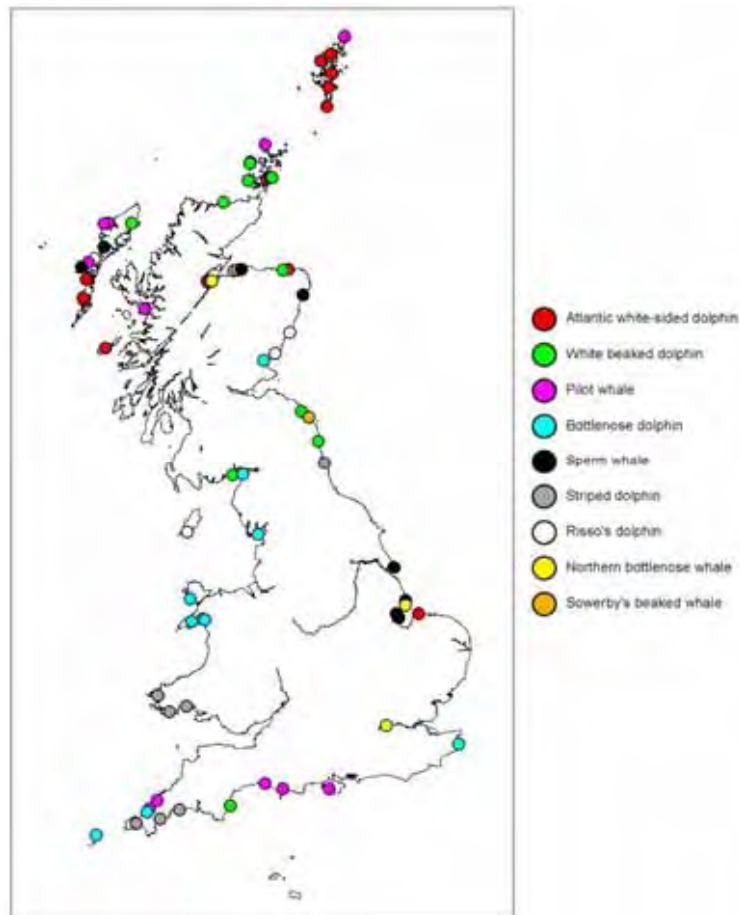


Figure 8 Distribution of other odontocete strandings in England, Scotland and Wales (2006)

Indeterminate species

Once decomposition or scavenging has destroyed identifiable external characteristics, distinguishing between morphologically similar species (such as short-beaked common dolphins and striped dolphins) can be difficult. Consequently, in 2006 there were 87 strandings of cetacea that were too decomposed, incomplete or inaccessible to enable either accurate identification or retrieval for further investigation at post mortem (Tables 1 and 2). These consisted of 31 indeterminate dolphins, 31 indeterminate cetaceans, 18 indeterminate odontocetes, three short beaked common dolphins/striped dolphins, two indeterminate mysticetes, one *Balaenoptera* sp. and one *Lagenorhynchus* sp.

Marine turtles

In 2006, there were eight strandings of leatherback turtles (*Dermochelys coriacea*) and six strandings of loggerhead turtles (*Caretta caretta*), numbers consistent with the previous four years (Tables 1 and 2). All eight leatherback turtles stranded in England, four loggerhead turtles stranded in Scotland and two loggerhead turtles stranded in Wales (Figure 9). The two loggerhead turtles from Wales were investigated at post mortem (Tables 3 and 6); one died from starvation/hypothermia and one died from pneumonia of unknown aetiology (Table 7).

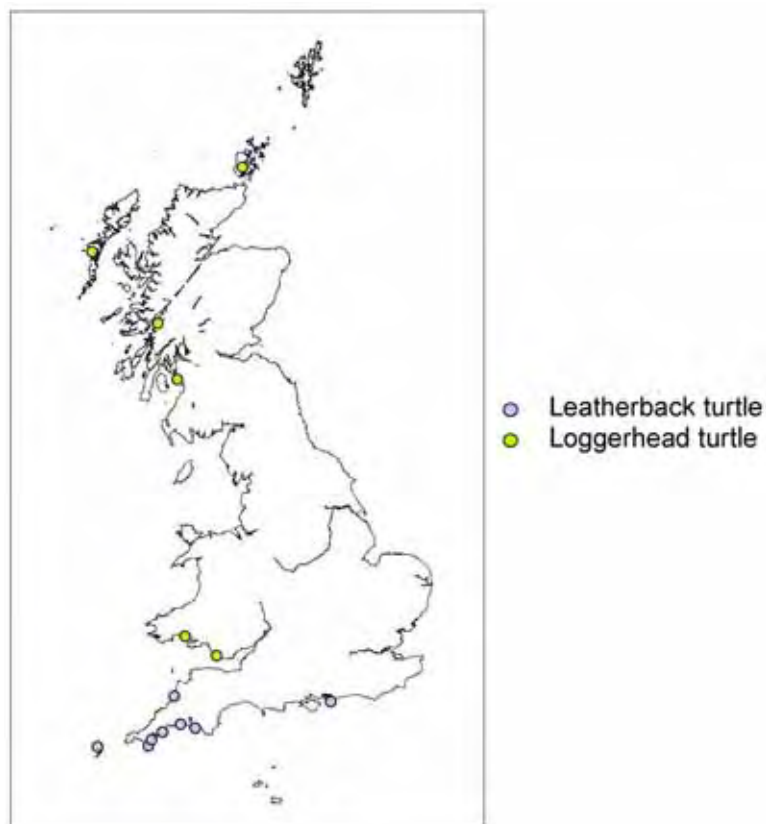


Figure 9 Distribution of marine turtle strandings in England, Scotland and Wales (2006)

Marine turtle stranding information in this section and in Tables 1 and 2 is provided courtesy of Marine Environmental Monitoring (MEM).

Table 3 Post-mortem investigations conducted on UK stranded cetaceans and marine turtles during 2006

Species	Number
Harbour porpoise (<i>Phocoena phocoena</i>)	102
Short-beaked common dolphin (<i>Delphinus delphis</i>)	21
Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	5
Striped dolphin (<i>Stenella coeruleoalba</i>)	4
Bottlenose dolphin (<i>Tursiops truncatus</i>)	4
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	4
White beaked dolphin (<i>Lagenorhynchus albirostris</i>)	3
Sperm whale (<i>Physeter catodon</i>)	2
Minke whale (<i>Balaenoptera acutorostrata</i>)	1
Loggerhead turtle (<i>Caretta caretta</i>)	2
Total	148

Table 4 Post-mortem investigations conducted on stranded cetaceans and marine turtles in England during 2006

Species	Number
Harbour porpoise (<i>Phocoena phocoena</i>)	42
Short-beaked common dolphin (<i>Delphinus delphis</i>)	18
Bottlenose dolphin (<i>Tursiops truncatus</i>)	3
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	3
Striped dolphin (<i>Stenella coeruleoalba</i>)	2
White beaked dolphin (<i>Lagenorhynchus albirostris</i>)	2
Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	1
Sperm whale (<i>Physeter catodon</i>)	1
Minke whale (<i>Balaenoptera acutorostrata</i>)	1
Total	73

Table 5 Post-mortem investigations conducted on stranded cetaceans and marine turtles in Scotland during 2006

Species	Number
Harbour porpoise (<i>Phocoena phocoena</i>)	36
Short-beaked common dolphin (<i>Delphinus delphis</i>)	2
Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	4
Striped dolphin (<i>Stenella coeruleoalba</i>)	1
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	1
White beaked dolphin (<i>Lagenorhynchus albirostris</i>)	1
Sperm whale (<i>Physeter catodon</i>)	1
Total	46

Table 6 Post-mortem investigations conducted on stranded cetaceans and marine turtles in Wales during 2006

Species	Number
Harbour porpoise (<i>Phocoena phocoena</i>)	24
Short-beaked common dolphin (<i>Delphinus delphis</i>)	1
Striped dolphin (<i>Stenella coeruleoalba</i>)	1
Bottlenose dolphin (<i>Tursiops truncatus</i>)	1
Loggerhead turtle (<i>Caretta caretta</i>)	2
Total	29

Table 7 Causes of death of cetaceans and marine turtles examined at post mortem in the UK in 2006

Species	Cause of death category	No.
Harbour porpoise	Starvation (including five neonates)	28
	Physical trauma (bottlenose dolphin attack)	18
	Pneumonia (parasitic/bacterial/mycotic)	14
	By-catch	11
	Gastropathy and/or enteropathy	6
	Live-stranding	5
	Physical trauma (unidentified cause)	5
	Physical trauma (possible boat strike)	4
	Generalised bacterial/fungal infection	3
	Pneumonia (unknown aetiology)	1
	Not established	7
Short-beaked common dolphin	By-catch	12
	Live-stranding	3
	Starvation	2
	Physical trauma (unidentified cause)	1
	Not established	3
Atlantic white-sided dolphin	Live-stranding	4
	Others	1
Striped dolphin	By-catch	1
	Live-stranding	1
	Starvation	1
	Not established	1
Bottlenose dolphin	Generalised bacterial/fungal infection	1
	Not established	3
Northern bottlenose whale	Live-stranding	3
	(Meningo) encephalitis	1
White-beaked dolphin	By-catch	1
	Pneumonia, parasitic and mycotic	1
	Others	1
Sperm whale	Live-stranding	2
Minke whale	Not established	1
Loggerhead turtle	Starvation	1
	Pneumonia (unknown aetiology)	1

Spatial distribution of the five main cause of death categories (starvation, infectious disease, by-catch, live-stranding and attack from bottlenose dolphins) for 2006 are given in the following figures (Figures 10-14)

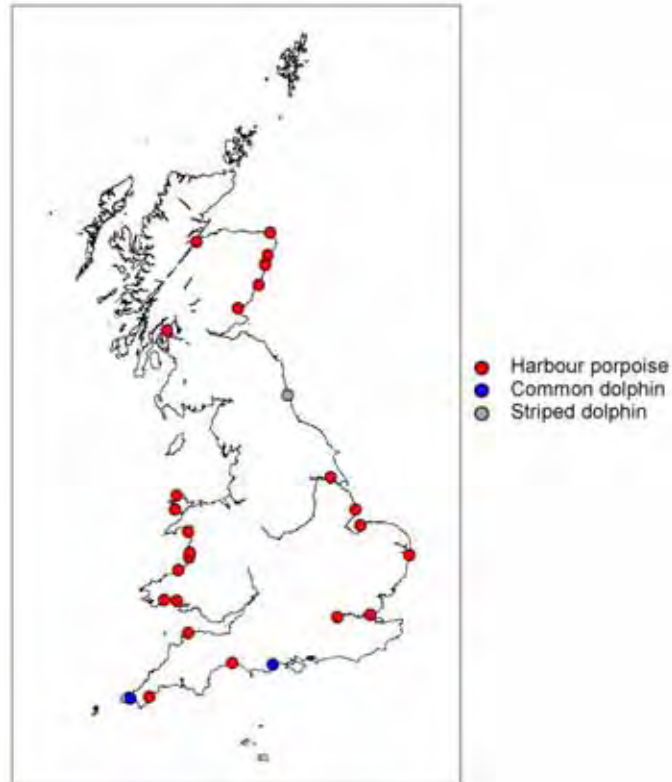


Figure 10 Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of starvation (2006)

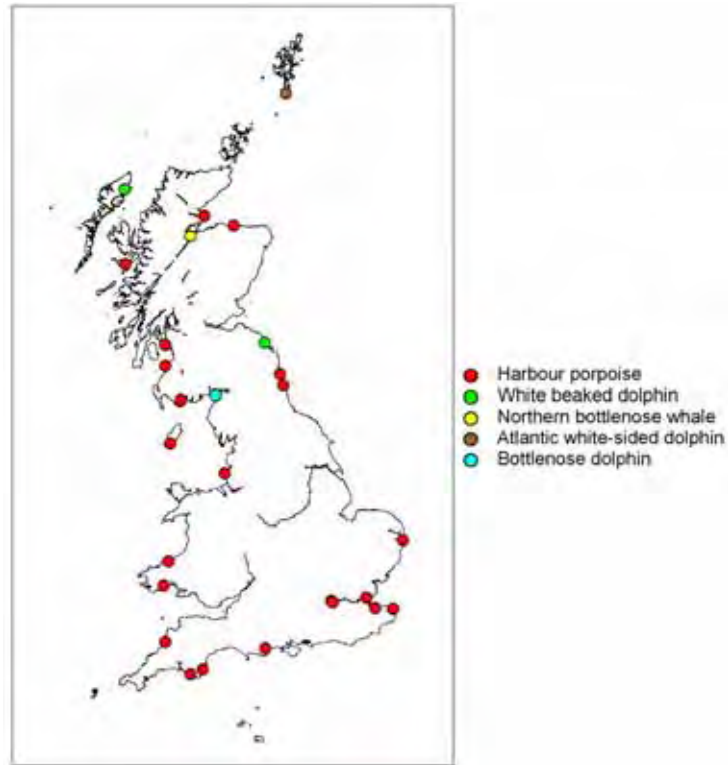


Figure 11 Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of infectious disease (2006)

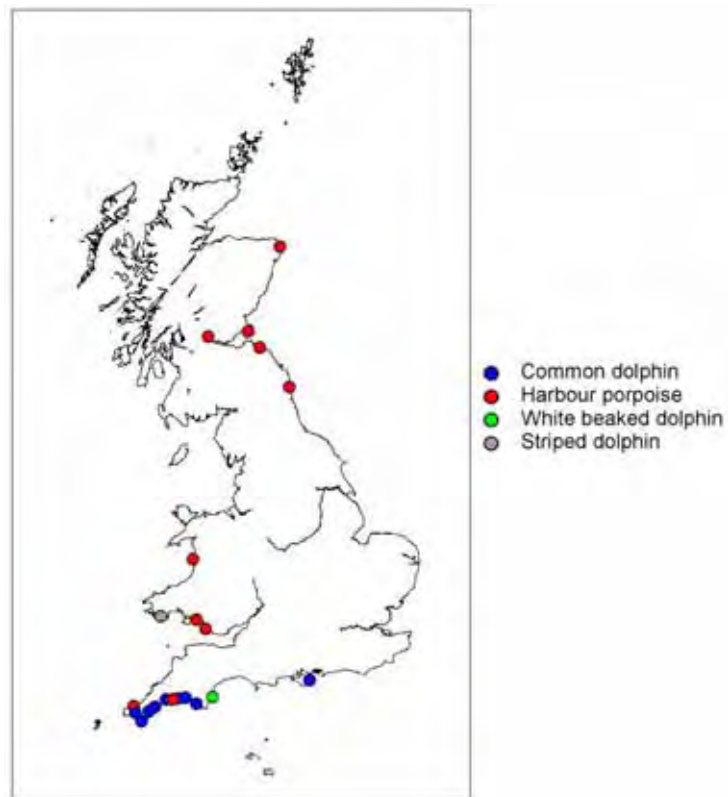


Figure 12 Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of by-catch (2006)

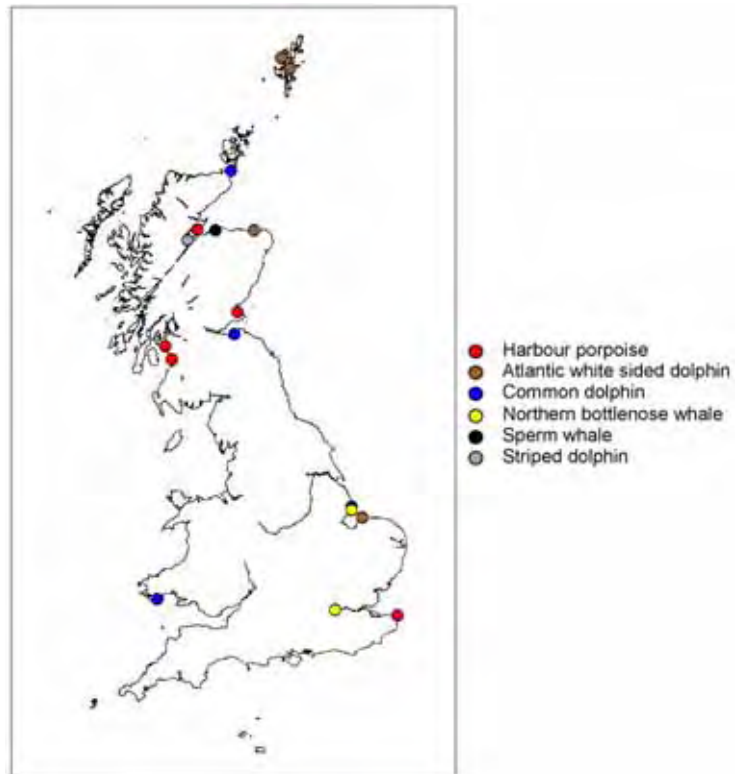


Figure 13 Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of live-stranding (2006)

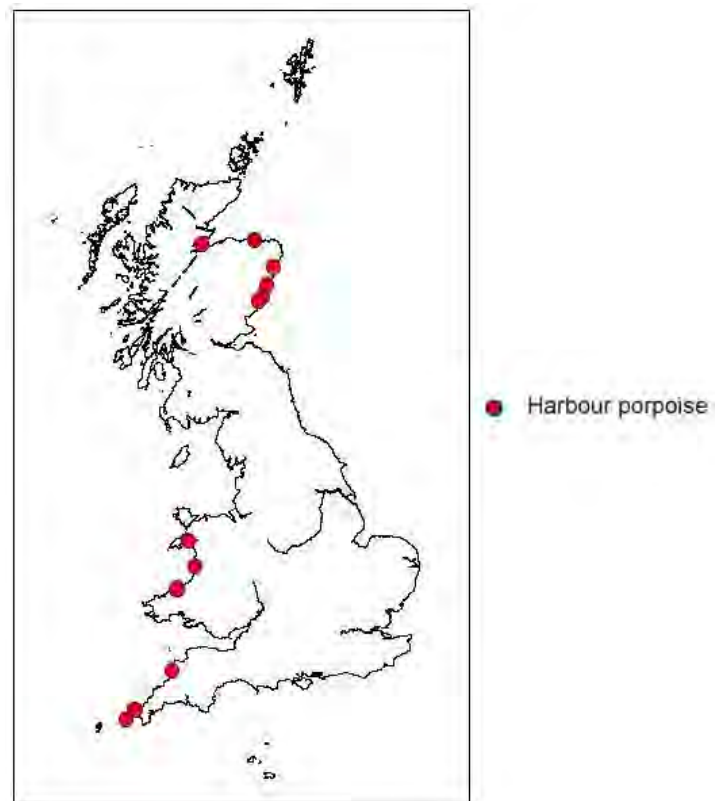


Figure 14 Spatial distribution of harbour porpoise strandings examined at post mortem diagnosed to have died as a result of violent interactions with bottlenose dolphins (2006)

Trends in selected cetacean mortality 2002-2006

Cause of death category data for each species are reported in the previous section (Table 7). In this section, annual data for several of the main cause of death categories in harbour porpoises and short-beaked common dolphins are reported for a five year period (2002-2006 inclusive). The cause of death categories were expressed as annual proportions in all cases where a cause of death was established (i.e. cases where a cause of death could not be identified were excluded). Data is shown for annual proportions of harbour porpoises that died of starvation, infectious disease, bycatch, live stranding and attack from bottlenose dolphins (Figure 15) and for bycatch, live stranding and infectious disease in short-beaked common dolphins (Figure 16).

The annual proportion of UK-stranded harbour porpoises diagnosed as by-catches varied between 11% and 25% in the 2002-2006 period (Figure 15). The proportion of UK-stranded common dolphins diagnosed as by-catch varied between 57-77% for the same period. The majority of these by-catches (for both species) occurred in SW England during the winter months. Although the annual numbers of harbour porpoises and common dolphin strandings reported in SW England has increased since the 1990s, a number of factors (particularly increased observer effort and possible changes in abundance and distribution of these species) are suspected to have played a role in this increase (Jepson 2006).

The infectious disease category predominantly includes pneumonias of bacterial/parasitic/fungal origin, generalised bacterial/fungal infections and infections of the gastro-intestinal tracts.

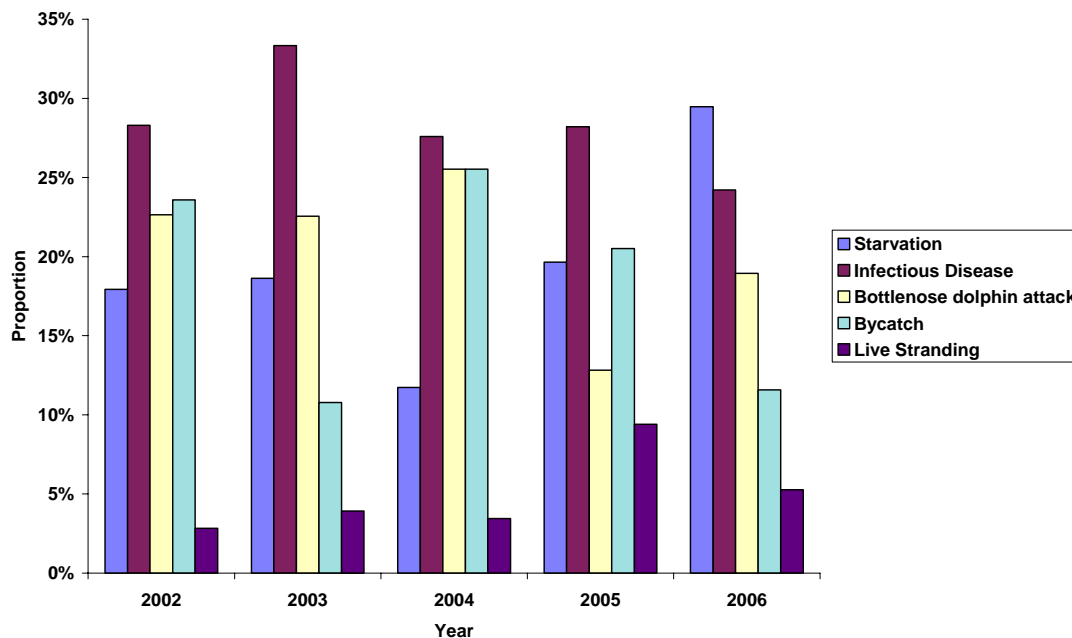


Figure 15 Proportions of major cause of death categories in UK stranded harbour porpoises examined at post mortem 2002-2006

NB Data for each of the cause of death categories above are expressed as the proportion of all cases where a cause of death was established.

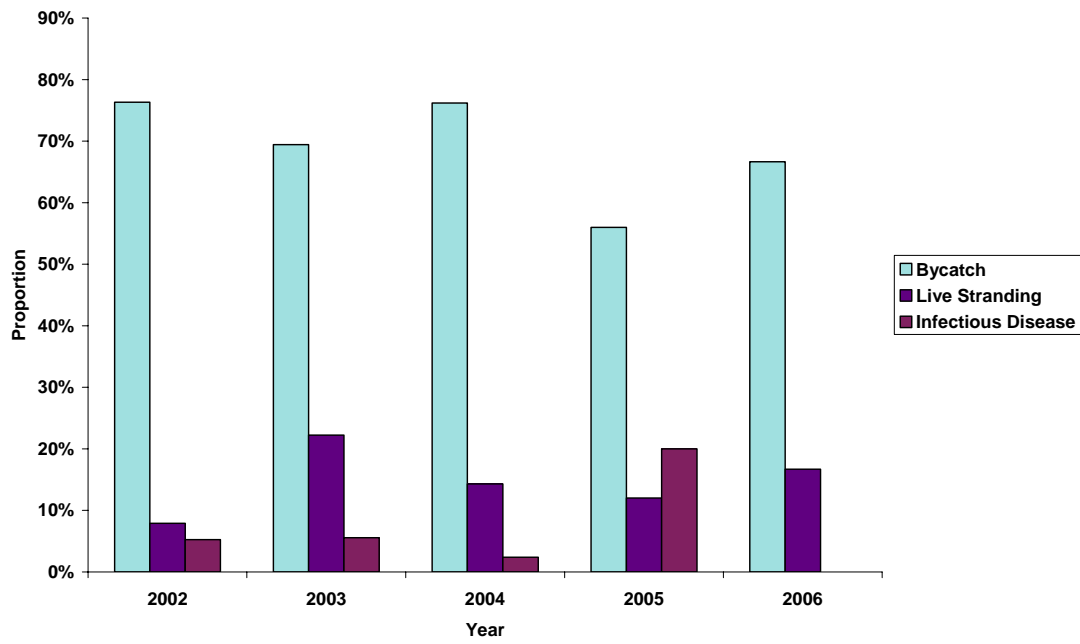


Figure 16 Proportions of major cause of death categories in UK-stranded short-beaked common dolphins examined at post mortem 2002-2006

NB Data for each of the cause of death categories above are expressed as the proportion of all cases where a cause of death was established.

Collaborations and outputs

Investigations of relationships between environmental contaminants and health status

In 2006, tissue samples collected by the CSIP from 100 UK-stranded cetaceans were analysed at the Centre for Environment, Fisheries & Aquaculture Science (CEFAS) Burnham Laboratory, Essex for the flame retardant compounds hexabromocyclododecane (HBCD) and tetrabromobisphenol A (TBBP-A).

Additional collaborative research activity

In addition to the collection, analysis and reporting for the purposes of CRO346, samples and data collected by the CSIP since 1990 were used for a variety of collaborative research purposes during the period of this report. These include;

- *Institute of Zoology (Zoological Society of London)*. A collaborative research programme to develop population-based models for the dynamics of parasites and their mammalian hosts, utilising data from UK-stranded cetaceans (specifically harbour porpoises), was initiated in 2004 in collaboration with Dr. Andrew Fenton and Dr. James Bull (see Bull *et al.* 2006).
- *Professor Antonio Fernandez, Facultad de Veterinaria Universidad de Las Palmas de Gran Canaria, Spain*. Pathological investigations into gas and fat embolism in cetaceans.
- *Professor Antonio Fernandez, Facultad de Veterinaria Universidad de Las Palmas de Gran Canaria, Spain*. Immunohistochemical investigations of intracytoplasmic inclusions in cetacean hepatocytes.
- *Professor Antonio Fernandez, Facultad de Veterinaria Universidad de Las Palmas de Gran Canaria, Spain*. Immunohistochemical studies of muscle fibre types and interstitial skeletal muscle fat globules in shallow and deep-diving cetaceans.
- *Dr. Simon Northridge, Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, St Andrews, Fife*. Teeth and stomach contents from cetaceans stranded in England and Wales are routinely sent for teeth ageing and stomach content analysis respectively. This biological data from UK stranded cetaceans forms an integral part of additional Defra-funded research on cetacean by-catch co-ordinated by the Sea Mammal Research Unit.
- *Dr. Phil Hammond, Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, St Andrews, Fife*. Provision of data from UK cetacean strandings for modelling component of 2005-2006 SCANSII research project (SCANSII has multiple funding sources including EU and Defra).

- *Dr. Ailsa Hall, Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, St Andrews, Fife.* Odds ratio analyses of the impacts of polychlorinated biphenyls (PCBs) on populations of harbour porpoises (see Hall et al., in review). These analyses have the potential to develop into future risk assessment-type analyses of the population-level impacts of PCBs in porpoise populations of known size and PCB exposure.
- *Dr. Ailsa Hall, Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, St Andrews, Fife.* Blubber and lung samples from UK-stranded seal and cetacean species are being analysed as part of a bioinformatics study of leptin (a multifunctional hormone involved in body fat regulation and respiratory function). The investigation is trying to determine how leptin structure has evolved in species with very different diving capabilities and physiologies.
- *Dr. Ailsa Hall, Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, St Andrews, Fife.* Marine mammal immune function studies. Liver samples from a range of UK-stranded marine mammal species are being used for exploratory studies of innate immunity, particularly the expression of antimicrobial peptides such as cathelicidins and defensins.
- *Moredun Research Institute, Pentlands Science Park, Bush Loan, Penicuik, Midlothian, EH26 0PZ, Scotland.* Expert neurohistopathological studies on cetacean tissues from Scottish cetaceans.
- *Dr. Graham Pierce, University of Aberdeen, Department of Zoology, Lighthouse Field Station, George Street, Cromarty, Ross-shire IV11 8YJ.* Collaboration on life history, dietary and toxicological studies of harbour porpoises and other cetaceans stranded in Scotland.
- *Dr. Paul Thompson, University of Aberdeen, Department of Zoology, Lighthouse Field Station, George Street, Cromarty, Ross-shire IV11 8YJ.* Collaboration on biological and genetic studies of harbour porpoises and bottlenose dolphins.
- *Dr. Krishna Das, Laboratory for Oceanology, MARE Center, B6c, Liège University, B-4000 Liège, Belgium/Dr. Ursula Siebert, Forschungs- und Technologiezentrum Westkueste Hafentoern D-25761 Buesum Germany.* A collaboration with these two research institutes was continued in 2006 to investigate potential thyrotoxic histopathological effects of persistent organic pollutants (such as PCBs) on thyroid microanatomy.
- *Dr. Ursula Siebert, Forschungs- und Technologiezentrum Westkueste Hafentoern D-25761 Buesum Germany.* On 1st October 2004, the Institute of Zoology began a small (Defra-funded) 2-year project to examine the feasibility of using formalin-fixed auditory tissue (ears) collected from UK-stranded cetaceans to investigate potential auditory impacts of anthropogenic noise exposure. The research is in collaboration with the Forschungs und Technologiezentrum Westkueste, Buesum, Germany. This research was completed in 2006 (see Jepson *et al.* 2006).
- *Dr. Charlie Dalley, Lab Testing Department, Veterinary Laboratory Agency, New Haw, Addlestone, Surrey, KT15 3NB.* Serological studies to assess exposure to *Leptospira* spp. in UK-stranded marine mammals (both seal

and cetacean). Collaboration initiated in 2005 with the Institute of Zoology (Mr. Arun Zachariah, Dr. Paul Jepson and Dr. Clyde Hutchinson), Sea Mammal Research Unit (Drs. Ailsa Hall and Paddy Pomeroy) and University of Aberdeen (Dr. Paul Thompson).

- *Dr Andrew Kitchener, Royal Museum of Scotland, Edinburgh, Scotland.* Recording all marine mammal stranding events in Scotland. Marine mammal skulls and scapulae are sent to Dr. Kitchener for marine mammal morphometric studies.
- *Dr Alistair MacMillan, Brucella Section, Veterinary Laboratories Agency, New Haw, Addlestone, Surrey, KT15 3NB.* Serological studies to assess exposure to *Brucella* spp. and typing of *Brucella* isolates.
- *Dr Jacques Godfroid, Centre d'etude et de la Recherches Veterinaires et Agronomiques, B-1180 Brussels, Belgium.* Molecular typing of *Brucella* isolates.
- *Professor David Collins, University of Reading, Reading RG6 6AP.* Sequencing of novel bacterial isolates.
- *Drs Marie-Francoise Van Bresseem and Tom Barrett, Institute of Animal Health, Pirbright, Surrey.* Serological surveys of UK-stranded cetacean and pinniped sera for antibodies to morbilliviruses.
- *Dr David Williams, Royal Veterinary College (University of London), Hawkshead Campus, Herts.* Ultrasonographic and physical anatomical comparison of axial and optical dimensions of the harbour porpoise eye.
- *Dr. Richard Morris, Department of Veterinary Pre-clinical Studies, University of Liverpool.* Anatomical studies of the innervation of the cetacean skin.
- *Dr. Peter Ditchfield, Department of Archaeology, University of Oxford.* Samples of bone, skin and blubber are supplied for studies of stable isotopes in marine mammal tissues.
- *Dr John Goold, University of Bangor, Bangor, Wales.* A small number of cetacean carcasses stranded in Wales are used as demonstration material to marine mammal MSc students at Bangor University. Tissues and data derived from these animals are also used to support MSc thesis projects as part-fulfilment of the MSc in Marine Mammal Science.
- *Dr John Pinnegar, CEFAS Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk, NR33 0HT.* Stable isotopes analyses of pinniped and harbour porpoise tissues from the central and southern North Sea as part of a Defra-funded R&D project (MF0323) centred on the Dogger Bank and central North Sea and looking at the importance of sandeels to various predators (mostly bird and fish).

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Table and Figure list

Tables

Table 1	Reported strandings of cetaceans and marine turtles in the UK for 2006	11
Table 2	Reported strandings of cetaceans and marine turtles in the UK 2002-2006	12
Table 3	Post-mortem investigations conducted on UK stranded cetaceans and marine turtles during 2006	23
Table 4	Post-mortem investigations conducted on stranded cetaceans and marine turtles in England during 2006	23
Table 5	Post-mortem investigations conducted on stranded cetaceans and marine turtles in Scotland during 2006	24
Table 6	Post-mortem investigations conducted on stranded cetaceans and marine turtles in Wales during 2006	24
Table 7	Causes of death of cetaceans and marine turtles examined at post mortem in the UK in 2006	25

Figures

Figure 1	Organisational structure of the CSIP	6
Figure 2	Reported cetacean strandings in England, Scotland and Wales 2002-2006	10
Figure 3	Annual numbers of UK stranded cetaceans, harbour porpoises and common dolphins (1990-2006)	13
Figure 4	Distribution of harbour porpoise strandings in England, Scotland and Wales (2006)	14
Figure 5	Distribution of short-beaked common dolphin strandings in England, Scotland and Wales (2006)	15
Figure 6	Monthly strandings of short-beaked common dolphins in the UK (2006)	15
Figure 7	Distribution of mysticete strandings in England, Scotland and Wales (2006)	20
Figure 8	Distribution of other odontocete strandings in England, Scotland and Wales (2006)	21
Figure 9	Distribution of marine turtle strandings in England, Scotland and Wales (2006)	22
Figure 10	Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of starvation (2006)	26
Figure 11	Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of infectious disease (2006)	27
Figure 12	Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of by-catch (2006)	27
Figure 13	Spatial distribution of cetacean strandings examined at post mortem diagnosed to have died as a result of live-stranding (2006)	28

Figure 14	Spatial distribution of harbour porpoise strandings examined at post mortem diagnosed to have died as a result of violent interactions with bottlenose dolphins (2006)	28
Figure 15	Proportions of major cause of death categories in UK stranded harbour porpoises examined at post mortem 2002-2006	29
Figure 16	Proportions of major cause of death categories in UK-stranded short-beaked common dolphins examined at post mortem 2002-2006	30

Plates

Front plate	Stranded sperm whale at Breast Sands, Norfolk 23 rd January 2003 (copyright Rob Deaville, ZSL)	1
Plate 1	Northern bottlenose whale swimming in the Thames 19 th January 2006 (copyright Rob Deaville, ZSL)	18
Plate 2	Post mortem examination of the Thames whale conducted by CSIP staff on 22 nd January 2006 (copyright Rod Penrose, MEM)	19

Acknowledgments

The success of the CSIP relies heavily upon the efforts of a countless number of individuals and organisations. In Wales, Dr Mandy McMath (CCW) and Robin Pratt have given enormous support to strandings research along with Jemma and Ray Lerwell, Paul Newman, Lin Gander, Nia Jones, Sal Shipley, Gerry Jones and Dr Harvard Prosser (WAG). Within England, Jan Loveridge, Jo Doyle and other members of the Cornwall Wildlife Trust have given endless and unstinting help with the coordination and reporting of cetacean strandings in Cornwall for many years, along with support from Dr. Nick Tregenza. Given the high density of cetacean strandings in south-west England, their individual and collective contribution has been immense. In Devon, Lindy Hingley, Devon Wildlife Trust and the National Marine Aquarium have been equally helpful in the reporting of a large number of strandings and the collection of carcasses for post-mortem examination. We would also like to acknowledge the ongoing efforts of the Durlston Marine Project and Hampshire Wildlife Trust (for strandings in Dorset and Hampshire), H. M. Coastguard, the Ulster Museum and the Irish Whale and Dolphin Group (for strandings in Northern Ireland) and the Environment Department, States of Jersey (for strandings in the Channel Islands)."

Pathologists contributing significantly to the research in the UK include Dr John Baker and Dr. Julian Chantry (University of Liverpool) and Bob Monies and Adrian Colloff (VLA Truro). Nick Davison (VLA Truro) has also been a great asset to the cetacean research in Cornwall. Within IoZ, Shaheed Macgregor, Shinto John and Professors Georgina Mace and Bill Holt have given considerable support to the development of the research on UK strandings. Colin Allchin and Bryn Jones conducted toxicological analyses of harbour porpoises at the CEFAS Burnham Laboratory.

Finally, many individuals and organisations have assisted with the reporting and collection of stranded carcasses for postmortem examination that are not directly involved in the project including the complete spectrum of coastguards and coastal local government authorities. A number of non Governmental organisations including the Whale and Dolphin Conservation Society, British Diver's Marine Life Rescue, RSPCA, Seawatch Foundation, WWF-UK and Marine Connection are also acknowledged for their general support of the research conducted by the UK Cetacean Strandings Investigation Programme.

APPENDIX Summary of causes of death of UK-stranded cetaceans and marine turtles examined at post-mortem (1st October- 31st December 2006)

NHM Ref	PM no.	Species	Sex	Length	Date	Location	County	Cause of death
SW2006/3	S2141	<i>Phocoena phocoena</i>	F	84	03/01/06	Borth	Ceredigion	starvation/hypothermia
SW2006/3A	XT042/06	<i>Phocoena phocoena</i>	M	88	04/01/06	Margate	Kent	acute interstitial pneumonia (possible aspiration)
SW2006/5	XT037/06	<i>Phocoena phocoena</i>	F	164	06/01/06	Ramsgate	Kent	parasitism, cardiac stomach (heavy)
SW2006/5E	M007/06	<i>Phocoena phocoena</i>	F	121	08/01/06	Johnshaven	Grampian	physical trauma (bottlenose dolphin attack)
SW2006/8	M72/1/06	<i>Delphinus delphis</i>	F	212	12/01/06	Downderry	Cornwall	physical trauma, by-catch
SW2006/9	XT120/06	<i>Phocoena phocoena</i>	F	131	13/01/06	Charmouth	Dorset	starvation
SW2006/10	M81/1/06	<i>Delphinus delphis</i>	F	148	13/01/06	Carne Beach	Cornwall	physical trauma, by-catch
SW2006/10A	M012/06	<i>Phocoena phocoena</i>	F	105	13/01/06	Balmedie	Grampian	physical trauma (bottlenose dolphin attack)
SW2006/11	M90/1/06	<i>Delphinus delphis</i>	F	214	14/01/06	Readmoney Cove	Cornwall	physical trauma, by-catch
SW2006/18	XT131/06	<i>Phocoena phocoena</i>	M	141	14/01/06	Hastings	East Sussex	physical trauma
SW2006/30A	M110/1/06	<i>Delphinus delphis</i>	F	170	17/01/06	Tolland	Cornwall	physical trauma, by-catch
SW2006/30B	M109/1/06	<i>Phocoena phocoena</i>	M	151	17/01/06	Tolland	Cornwall	physical trauma, by-catch
SW2006/32	M205/01/06	<i>Delphinus delphis</i>	M	217	16/01/06	Mount Wise	Devon	physical trauma, by-catch
SW2006/33	M204/01/06	<i>Delphinus delphis</i>	F	220	16/01/06	Devonport Dockyard	Devon	physical trauma, by-catch
SW2006/34	XT126/06	<i>Phocoena phocoena</i>	M	108	17/01/06	Pegwell Bay	Kent	parasitism, (multiple sites, heavy) (possible sequel to live bycatch)
SW2006/34C	M017/06	<i>Phocoena phocoena</i>	M	131	17/01/06	Garlieston	Dumfries	generalised bacterial infection
SW2006/39	M277/01/06	<i>Delphinus delphis</i>	M	219	20/01/06	Leasfoot Sand	Devon	not established
SW2006/40	EXTERNAL	<i>Hyperoodon ampullatus</i>	F	585	21/01/06	Battersea Bridge	Greater London	live stranding, died during rescue
SW2006/41	XT112/06	<i>Phocoena phocoena</i>	F	100	21/01/06	Putney Bridge	Greater London	starvation/hypothermia
SW2006/41D	M023/06	<i>Phocoena phocoena</i>	F	112	24/01/06	Ardentinny	Strathclyde	starvation/hypothermia
SW2006/41G	06L-2880	<i>Phocoena phocoena</i>	M	136	26/01/06	Derbeyhaven	Isle of Man	pneumonia, parasitic
SW2006/48A	XT164/06	<i>Phocoena phocoena</i>	M	110	30/01/06	Broadstairs	Kent	live stranding
SW2006/51D	M24/2/06	<i>Phocoena phocoena</i>	F	163	03/02/06	Porthcurno Beach	Cornwall	physical trauma (bottlenose dolphin attack)
SW2006/53A	M68/2/06	<i>Phocoena phocoena</i>	F	163	09/02/06	Hayle Beach	Cornwall	physical trauma, by-catch
SW2006/54	XT224/06	<i>Phocoena phocoena</i>	F	107	09/02/06	Cemaes Bay	Anglesey	starvation/hypothermia
SW2006/54B	M033/06	<i>Phocoena phocoena</i>	F	151	10/02/06	North Sands	Strathclyde	live stranding
SW2006/55	XT222/06	<i>Phocoena phocoena</i>	F	107	11/02/06	New Quay	Ceredigion	starvation/hypothermia
SW2006/56	XT200/06	<i>Phocoena phocoena</i>	M	139	12/02/06	Kessingland Beach	Suffolk	starvation/hypothermia
SW2006/57	XT217/06	<i>Phocoena phocoena</i>	M	80	12/02/06	Aberystwyth	Ceredigion	starvation/hypothermia (neonate)
SW2006/58C	M99/2/06	<i>Delphinus delphis</i>	F	191	15/02/06	Kynance Cove	Cornwall	physical trauma, by-catch

NHM Ref	PM no.	Species	Sex	Length	Date	Location	County	Cause of death
SW2006/59	EXTERNAL	<i>Physeter catodon</i>	M	1390	15/02/06	Skegness	Lincolnshire	live stranding
SW2006/66A	XT219/06	<i>Phocoena phocoena</i>	F	156	17/02/06	Ingoldmells	Lincolnshire	starvation/hypothermia
SW2006/67	XT215/06	<i>Phocoena phocoena</i>	F	125	18/02/06	Swansea	Swansea	physical trauma, by-catch
SW2006/68	XT202/06	<i>Phocoena phocoena</i>	F	153	18/02/06	Swansea	Swansea	physical trauma, by-catch
SW2006/68B	XT221/06	<i>Phocoena phocoena</i>	F	113	21/02/06	Winterton Ness	Norfolk	physical trauma (possible boat strike)
SW2006/68D	M128/2/06	<i>Delphinus delphis</i>	M	173	20/02/06	Pentreath Beach	Cornwall	physical trauma
SW2006/68E	M036/06	<i>Phocoena phocoena</i>	F	110	18/02/06	Newburgh	Grampian	starvation/hypothermia
SW2006/68F	M037/06	<i>Phocoena phocoena</i>	M	128	19/02/06	Portmahomack	Highland	pneumonia, parasitic and epistaxis
SW2006/70A	M136/2/06	<i>Phocoena phocoena</i>	F	143	20/02/20	Carbis Bay	Cornwall	physical trauma (bottlenose dolphin attack)
SW2006/70B	M038/06	<i>Phocoena phocoena</i>	M	108	20/02/06	Stonehaven	Grampian	physical trauma (bottlenose dolphin attack)
SW2006/71A	M039/06	<i>Phocoena phocoena</i>	M	119	22/02/06	Strathlene	Grampian	pneumonia, parasitic and bacterial
SW2006/75A	M043/06	<i>Phocoena phocoena</i>	M	122	25/02/06	Scotstown	Grampian	physical trauma, by-catch
SW2006/76	XT364/06	<i>Phocoena phocoena</i>	M	139	25/02/06	Lowestoft	Suffolk	parasitism (multiple sites, heavy)
SW2006/77	M171/2/06	<i>Phocoena phocoena</i>	F	188	27/02/06	Carbis Bay	Cornwall	physical trauma (bottlenose dolphin attack)
SW2006/78	XT333/06	<i>Phocoena phocoena</i>	M	142	01/03/06	Swale	Kent	parasitism, gastric (heavy)
SW2006/82	S2142	<i>Phocoena phocoena</i>	F	164	05/03/06	Ainsdale	Merseyside	pneumonia, parasitic
SW2006/83B	M049/06	<i>Phocoena phocoena</i>	M	109	07/03/06	Whitehills	Grampian	physical trauma (bottlenose dolphin attack)
SW2006/85	XT375/06	<i>Delphinus delphis</i>	F	206	09/03/06	Bournemouth Beach	Dorset	starvation
SW2006/87	S2143	<i>Phocoena phocoena</i>	M	114	12/03/06	Borth	Ceredigion	starvation/hypothermia
SW2006/87A	XT395/06	<i>Phocoena phocoena</i>	F	110	12/03/06	Goxhill	Lincolnshire	emaciation/starvation (intestinal parasitism)
SW2006/88B	M73/3/06	<i>Delphinus delphis</i>	F	-9	13/03/06	Gyllyngvase Beach	Cornwall	physical trauma, by-catch
SW2006/89C	M83/3/06	<i>Delphinus delphis</i>	M	262	14/03/06	Castle Beach	Cornwall	physical trauma, by-catch
SW2006/91D	M053/06	<i>Phocoena phocoena</i>	F	104	15/03/06	Gourdon	Grampian	starvation/hypothermia
SW2006/94G	M066/06	<i>Lagenorhynchus acutus</i>	F	225	21/03/06	Crovie	Grampian	live stranding
SW2006/96	XT422/06	<i>Phocoena phocoena</i>	M	112	22/03/06	Blyth	Northumberland	parasitism, cardiac and pulmonary (heavy)
SW2006/97	XT421/06	<i>Phocoena phocoena</i>	M	147	23/03/06	Whitley Bay	North Tyneside	parasitism (multiple sites, heavy)
SW2006/97E	M074/06	<i>Phocoena phocoena</i>	M	106	25/03/06	Rosemarkie	Highland	physical trauma (bottlenose dolphin attack)
SW2006/97F	M075/06	<i>Phocoena phocoena</i>	M	117	27/03/06	Cambo Sands	Fife	not established
SW2006/98	06L-1341	<i>Tursiops truncatus</i>	M	251	28/03/06	Black Rock Sands	Gwynedd	not established

NHM Ref	PM no.	Species	Sex	Length	Date	Location	County	Cause of death
SW2006/101	XT589/06	<i>Phocoena phocoena</i>	M	127	29/03/06	Battersea Bridge	Greater London	not established
SW2006/102	M474-03-06	<i>Delphinus delphis</i>	M	196	29/03/06	Bigbury on Sea	Devon	physical trauma, by-catch
SW2006/104F	M077/06	<i>Phocoena phocoena</i>	M	104	29/03/06	Aberdeen Beach	Grampian	starvation/hypothermia
SW2006/104G	M078/06	<i>Phocoena phocoena</i>	M	114	29/03/06	Aberdeen Beach	Grampian	starvation/hypothermia
SW2006/105	XT678/06	<i>Phocoena phocoena</i>	M	115	31/03/06	Kessingland Beach	Suffolk	starvation/hypothermia
SW2006/106G	M084/06	<i>Phocoena phocoena</i>	U	115	02/04/06	Loch Eil	Highland	not established
SW2006/108E	M085/06	<i>Phocoena phocoena</i>	F	126	03/04/06	Fairlie	Strathclyde	live stranding
SW2006/110	XT751/06	<i>Phocoena phocoena</i>	M	118	07/04/06	Llandanwg	Gwynedd	starvation/hypothermia
SW2006/110B	M088/06	<i>Phocoena phocoena</i>	M	103	06/04/06	Aberdeen Beach	Grampian	starvation/hypothermia
SW2006/110D	M090/06	<i>Phocoena phocoena</i>	M	106	06/04/06	Inverallochy	Grampian	starvation/hypothermia
SW2006/112	XT463/06	<i>Phocoena phocoena</i>	F	149	09/04/06	Aberporth	Ceredigion	physical trauma (bottlenose dolphin attack)
SW2006/114B	M094/06	<i>Phocoena phocoena</i>	M	138	11/04/06	Thorntonloch	Lothian	physical trauma, by-catch
SW2006/117	XT495/06	<i>Phocoena phocoena</i>	M	139	13/04/06	Hammersmith Bridge	Greater London	physical trauma (possible boat strike)
SW2006/118	XT496/06	<i>Phocoena phocoena</i>	M	153	13/04/06	Wandsworth Bridge	Greater London	pneumonia, parasitic
SW2006/120C	M097/06	<i>Phocoena phocoena</i>	F	117	13/04/06	Cambus	Clackmannanshire	physical trauma, by-catch
SW2006/120D	M099/06	<i>Phocoena phocoena</i>	F	114	13/04/06	Cromarty	Highland	live stranding
SW2006/122	XT500/06	<i>Phocoena phocoena</i>	F	118	14/04/06	Rochester	Kent	starvation/hypothermia
SW2006/122A	M98/4/06	<i>Delphinus delphis</i>	M	227	14/04/06	Marazion	Cornwall	starvation/old age
SW2006/125	XT507/06	<i>Stenella coeruleoalba</i>	F	159	16/04/06	Whitley Bay	Tyne and Wear	starvation/hypothermia
SW2006/126	XT511/06	<i>Phocoena phocoena</i>	M	150	16/04/06	Cresswell	Northumberland	parasitism, gastric (heavy)
SW2006/126C	M97/4/06	<i>Phocoena phocoena</i>	M	134	18/04/06	Hayle	Cornwall	physical trauma (bottlenose dolphin attack)
SW2006/126D	M105/06	<i>Lagenorhynchus acutus</i>	F	212	16/04/06	Urafirth	Shetland	live stranding
SW2006/128	S2144	<i>Phocoena phocoena</i>	F	112	18/04/06	Porth Cwyfan	Anglesey	starvation/hypothermia
SW2006/130	M128/4/06	<i>Tursiops truncatus</i>	F	341	20/04/06	Watermill Cove	Cornwall	not established
SW2006/132	XT523/06	<i>Phocoena phocoena</i>	F	106	22/04/06	Enderby Wharf	Greater London	physical trauma (possible boat strike)
SW2006/135	XT1243/06	<i>Phocoena phocoena</i>	M	122	24/04/06	Borth	Ceredigion	physical trauma (bottlenose dolphin attack)
SW2006/138	XT759/06	<i>Phocoena phocoena</i>	M	111	30/04/06	Tywyn	Gwynedd	physical trauma, by-catch
SW2006/140A	M117/06	<i>Phocoena phocoena</i>	M	119	01/05/06	Montrose Bay	Tayside	physical trauma (bottlenose dolphin attack)
SW2006/143A	M124/06	<i>Phocoena phocoena</i>	M	126	06/05/06	Montrose Bay	Tayside	physical trauma (bottlenose dolphin attack)
SW2006/147	M126/06	<i>Phocoena phocoena</i>	F	157	07/05/06	St Andrews	Fife	live stranding
SW2006/158	M100/5/06	<i>Phocoena phocoena</i>	M	89	15/05/06	Towan Beach	Cornwall	starvation/hypothermia (neonate)

NHM Ref	PM no.	Species	Sex	Length	Date	Location	County	Cause of death
SW2006/160B	M139/06	<i>Phocoena phocoena</i>	M	141	17/05/06	Rosemarkie Beach	Highland	physical trauma (bottlenose dolphin attack)
SW2006/163	XT1073/06	<i>Phocoena phocoena</i>	F	173	20/05/06	Amroth	Pembrokeshire	parasitism, gastric (heavy)
SW2006/163B	M141/06	<i>Phocoena phocoena</i>	F	152	20/05/06	off Sound of Rhum	Highland	pneumonia, parasitic
SW2006/165	S2146	<i>Stenella coeruleoalba</i>	M	201	22/05/06	Freshwater East	Pembrokeshire	physical trauma, by-catch
SW2006/166D	M144/06	<i>Phocoena phocoena</i>	M	114	25/05/06	Alturlie	Highland	starvation/hypothermia
SW2006/170C	M12/6/06	<i>Phocoena phocoena</i>	M	120	01/06/06	Widemouth Bay	Devon	parasitism, pulmonary and cardiac (heavy)
SW2006/172	XT702/06	<i>Phocoena phocoena</i>	F	156	09/06/06	Aberporth	Ceredigion	enteritis (necro-haemorrhagic), bacterial (<i>Clostridium</i> spp.)
SW2006/172A	M152/06	<i>Phocoena phocoena</i>	M	78	11/06/06	Tayport	Fife	starvation/hypothermia (neonate)
SW2006/173	XT709/06	<i>Phocoena phocoena</i>	F	98	12/06/06	Wisemans Bridge	Pembrokeshire	starvation/hypothermia
SW2006/177A	M151/06	<i>Phocoena phocoena</i>	M	150	16/06/06	Balmedie	Grampian	not established
SW2006/180F	M158/06	<i>Lagenorhynchus acutus</i>	F	220	20/06/06	Ayre of Dury	Shetland	live stranding
SW2006/187C	M163/06	<i>Stenella coeruleoalba</i>	F	152	24/06/06	Corgrain Point	Highland	live stranding
SW2006/188	XT743/06	<i>Lagenorhynchus albirostris</i>	M	178	26/06/06	Berwick on Tweed	Northumberland	disseminate fungal ear infection
SW2006/189	S2148	<i>Phocoena phocoena</i>	F	76	29/06/06	Tenby	Pembrokeshire	physical trauma
SW2006/190	XT785/06	<i>Phocoena phocoena</i>	M	135	05/07/06	Amble	Northumberland	physical trauma, by-catch
SW2006/200	XT845/06	<i>Phocoena phocoena</i>	M	81	21/07/06	Hunstanton	Norfolk	starvation/hypothermia (neonate)
SW2006/204	XT1299/06	<i>Phocoena phocoena</i>	F	156	26/07/06	Porthcawl	Bridgend	physical trauma, by-catch
SW2006/205A	M139/7/06	<i>Phocoena phocoena</i>	F	108	29/07/06	Summerleaze	Cornwall	physical trauma (bottlenose dolphin attack)
SW2006/222	M177/08/06	<i>Phocoena phocoena</i>	F	98	14/08/06	Combe Martin Beach	Devon	starvation
SW2006/223	XT1019/06	<i>Phocoena phocoena</i>	M	133	18/08/06	Dartmouth Harbour	Devon	haemorrhage, pulmonary (parasitic and acute)
SW2006/223A	M218/06	<i>Phocoena phocoena</i>	F	138	19/08/06	Pittenweem	Fife	physical trauma, by-catch
SW2006/228	XT1196/06	<i>Phocoena phocoena</i>	F	130	24/08/06	Folkestone	Kent	physical trauma (possible by-catch)
SW2006/230	06L-4208	<i>Phocoena phocoena</i>	F	122	24/08/06	Castell Beach	Ceredigion	physical trauma (bottlenose dolphin attack)
SW2006/231	XT042/07	<i>Phocoena phocoena</i>	M	73	24/08/06	Tresaith	Ceredigion	physical trauma (bottlenose dolphin attack)
SW2006/235	XT1133/06	<i>Phocoena phocoena</i>	M	109	30/08/06	Southend Pier	Essex	possible polymicrobial generalised bacterial infection
SW2006/236.1	EXTERNAL	<i>Hyperoodon ampullatus</i>	F	648	31/08/06	Skegness	Lincolnshire	live stranding
SW2006/236.2	EXTERNAL	<i>Hyperoodon ampullatus</i>	M	680	31/08/06	Skegness	Lincolnshire	live stranding

NHM Ref	PM no.	Species	Sex	Length	Date	Location	County	Cause of death
SW2006/237	EXTERNAL	<i>Balaenoptera acutorostrata</i>	F	340	31/08/06	Gravesend	Essex	not established
SW2006/240	06L-4209	<i>Phocoena phocoena</i>	M	88	04/09/06	Cardigan Island	Ceredigion	physical trauma
SW2006/242B	M231/06	<i>Phocoena phocoena</i>	F	157	06/09/06	Turnberry Beach	Strathclyde	pneumonia, parasitic and bacterial
SW2006/245A	XT1271/06	<i>Phocoena phocoena</i>	M	103	10/09/06	Abersoch Harbour	Gwynedd	physical trauma
SW2006/248	XT073/07	<i>Phocoena phocoena</i>	M	81	14/09/06	Pembrey	Carmarthenshire	starvation/hypothermia (neonate)
SW2006/252	XT1172/06	<i>Phocoena phocoena</i>	F	150	18/09/06	Battersea	Greater London	physical trauma (possible boat strike)
SW2006/257	XT059/07	<i>Phocoena phocoena</i>	F	115	30/09/06	Lydstep	Pembrokeshire	not established
SW2006/257A	M9/10/06	<i>Stenella coeruleoalba</i>	M	232	30/09/06	Marazion	Cornwall	not established
SW2006/258B	M254/06	<i>Lagenorhynchus albirostris</i>	F	133	04/10/06	Stornoway	Western Isles	pneumonia, parasitic and fungal
SW2006/260	XT1241/06	<i>Phocoena phocoena</i>	M	118	09/10/06	Bantham	Devon	pneumonia, parasitic
SW2006/262	XT1244/06	<i>Phocoena phocoena</i>	F	158	09/10/06	Poole	Dorset	generalised mycotic infection (<i>Aspergillus fumigatus</i>)
SW2006/267D	M261/06	<i>Hyperoodon ampullatus</i>	M	483	16/10/06	Craigton	Highland	encephalitis, fungal
SW2006/273A	M267/06	<i>Delphinus delphis</i>	M	230	26/10/06	John O'Groats	Highland	live stranding
SW2006/277	XT1360/06	<i>Lagenorhynchus acutus</i>	M	240	09/11/06	Brancaster	Norfolk	live stranding
SW2006/278A	M281/06	<i>Phocoena phocoena</i>	F	156	13/11/06	Seamill	Strathclyde	pneumonia, parasitic
SW2006/284A	M286/06	<i>Lagenorhynchus acutus</i>	F	138	22/11/06	West Voe	Shetland	liver infection (<i>Streptococcus equi</i>)
SW2006/285B	M296/06	<i>Phocoena phocoena</i>	F	145	25/11/06	Glenelg Bay	Highland	not established
SW2006/286	XT1426/06	<i>Delphinus delphis</i>	M	200	28/11/06	Atherfield	Isle of Wight	physical trauma, by-catch
SW2006/288	XT1469/06	<i>Phocoena phocoena</i>	M	98	01/12/06	Criccieth	Gwynedd	physical trauma (possible bottlenose d dolphin attack)
SW2006/291	M16/12/06	<i>Delphinus delphis</i>	M	193	04/12/06	Praa Sands	Cornwall	physical trauma, by-catch
SW2006/294B	M304/06	<i>Delphinus delphis</i>	M	215	07/12/06	Longniddry	Lothian	live stranding
SW2006/297	XT1487/06	<i>Delphinus delphis</i>	M	117	08/12/06	Manorbier	Pembrokeshire	live stranding
SW2006/298A	M64/12/06	<i>Delphinus delphis</i>	F	191	12/12/06	Porthleven	Cornwall	not established
SW2006/298B	M305/06	<i>Physeter catodon</i>	M	1320	10/12/06	Roseisle	Grampian	live stranding
SW2006/300	XT1459/06	<i>Tursiops truncatus</i>	F	260	12/12/06	Skinburness	Cumbria	generalised bacterial infection (<i>Erysipelothrix rhusiopathiae</i>)
SW2006/305	M93/12/06	<i>Delphinus delphis</i>	M	183	18/12/06	St Peter's Point	Cornwall	not established
SW2006/307	M100/12/06	<i>Tursiops truncatus</i>	M	288	19/12/06	Porthtownan	Cornwall	not established (possible bycatch)
SW2006/310	M309/12/06	<i>Lagenorhynchus albirostris</i>	F	237	24/12/06	Shoalstone	Devon	physical trauma, by-catch
SW2006/310A	M309/06	<i>Phocoena phocoena</i>	F	115	26/12/06	Balmacara Bay	Highland	not established

NHM Ref	PM no.	Species	Sex	Length	Date	Location	County	Cause of death
T2006/39	07-0316	<i>Caretta caretta</i>	F	65	01/12/06	Pembrey	Carmarthenshire	bilateral chronic pneumonia and tracheobronchitis
T2006/44	XT018/07	<i>Caretta caretta</i>	U	27	23/12/06	Southerndown	Vale of Glamorgan	starvation/hypothermia

NB The data in this appendix is subject to revision and possible change, pending the results of follow up investigations.