

**U.K. PROGRESS REPORT ON CETACEAN RESEARCH, APRIL 2004 TO MAY 2005 WITH
STATISTICAL DATA FOR THE CALENDAR YEAR 2004**

Compiled by Alice Mackay and Simon Northridge
Sea Mammal Research Unit, Gatty Marine Laboratory,
University of St Andrews, St Andrews, Scotland, KY16 8LB

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to:
Harbour porpoise	<i>Phocoena phocoena</i>	UK, W. Scotland,	2.1.1, 2.1.2, 2.2, 3.1.3, 4.2, 4.3, 4.4, 5, 7.1, 8, 9
Common Bottlenose dolphin	<i>Tursiops truncatus</i>	UK- NE Scotland; W Scotland, Portugal, Pakistan, ,USA- Florida, Croatia, Dominican Republic	2.1.1, 2.2, 3.1.1, 3.2, 3.1.3, 4.1, 4.2, 4.3, 5, 9
Striped dolphins	<i>Stenella coeruleoalba</i>	UK	4.3
Shortbeaked Common dolphin	<i>Delphinus delphis</i>	UK	2.1.1, 3.1.1, 4.3, 7.1, 9
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	UK	4.3
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	UK	4.3
Atlantic Spotted dolphin	<i>Stenella frontalis</i>	Dominican Republic,	2.1.1, 3.1.1
Peales dolphins	<i>Lagenorhynchus australis</i>	Chile	2.1.1, 2.2, 3.1.1
Chilean dolphins	<i>Cephalorhynchus eutropia</i>	Chile	2.1.1, 2.2, 3.1.1
Spinner dolphins	<i>Stenella longirostris</i>	Egypt (Red Sea), Oman	2.1.1, 3.1.1
Finless porpoise	<i>Neophocaena phocaenoides</i>	Pakistan	2.1.1, 3.1.1
Humpback dolphin	<i>Sousa chinensis</i>	Pakistan	2.1.1, 3.1.1
Risso's dolphin	<i>Grampus griseus</i>	UK	2.1.1, 3.1.1, 4.3, 7.1, 9
Killer whales	<i>Orcinus orca</i>	Western Scotland, NE Pacific	3.1.1, 3.2, 5, 9
Boto	<i>Inia geoffrensis</i>	Brazilian Amazon	2.1.1, 3.1.1
Tucuxi	<i>Sotalia fluviatilis</i>	Brazilian Amazon	2.1.1,
Pygmy sperm whale	<i>Kogia breviceps</i>	UK	5
Sperm whales	<i>Physeter macrocephalus</i>	Mediterranean, UK, Iceland	2.1.1, 2.1.2, 3.1.1, 4.3, 4.4, 5, 9
Long-finned pilot whales	<i>Globicephala melas</i>	Iceland, UK	3.1.1, 4.3
Beaked whale sp.		UK	2.1.2, 2.2, 4.4, 8, 9
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	UK	5
Sowerby's beaked whale	<i>Mesoplodon bidens</i>	UK	4.3, 5, 9
North Atlantic Right whales	<i>Eubalaena glacialis</i>	NW Atlantic	
Northern Bottlenose whales	<i>Hyperoodon ampullatus</i>	Eastern Canada, UK	5
Humpback whales	<i>Megaptera novaeangliae</i>	Sultanate of Oman, NW Atlantic, Dominican Republic	2.1.1, 3.1.1, 3.1.3
Fin whale	<i>Balaenoptera physalus</i>	Pakistan	2.1.1, 3.1.1, 4.3, 6.2
Bryde's whale	<i>Balaenoptera edeni</i>	Pakistan	2.1.1, 3.1.1
Minke whale	<i>Balaenoptera acutorostrata</i>	Firth of Clyde & Clyde Sea, W Scotland.	2.1.1, 3.1.1, 4.3
Blue whale	<i>Balaenoptera musculus</i>	Iceland,	3.1.1
Sei whale	<i>Balaenoptera borealis</i>	UK	5

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

CRRU conducts dedicated surveys during the summer between Lossiemouth and Fraserburgh on the southern side of the Moray Firth, Northeast Scotland. Harbour porpoises, bottlenose dolphins and minke whales are the most frequently sighted species. Current studies aim to incorporate incidental

strandings data with sightings data to provide a better determination of the cetacean species in these waters.

Friends of Cardigan Bay conducted boat-based surveys off two Sarns and offshore Cardigan Bay, Wales in 2004. Sarn Cynfelin was identified as a possible hotspot for cetacean activity, (Hughes & Thomas, 2005).

Gower Peninsula to Swansea Bay Local Biodiversity Action Plan (LBAP) Partnership, conducted an acoustic survey for harbour porpoises in Carmarthen Bay Wales between 2002-2004. This acoustic survey enabled comparison between results gained from static TPODs and towed hydrophone arrays. Preliminary results show that there is a year-round porpoise presence of porpoises in this area.

HWDT is engaged in a 3-year programme of standardised surveys in Southwest Scotland between the Small Isles and the Kintyre peninsula. Standardised surveys of Southwest Scotland started in 2002. The HWDT research vessel undertakes monthly 10 day cruises from March through to October throughout the area. Standard line transect methods are employed as well as audio band and high frequency porpoise acoustic surveys

HWDT is conducting dedicated land-based surveys from the Ardnamurchan peninsula (W. Scotland) to investigate, in particular, minke whale habitat use and behaviour with respect to boat traffic. Preliminary studies showed changes in habitat use through the summer and autumn as well as some evidence of boat traffic effecting minke whale behaviour. This work is ongoing for 2004 to 2005.

HWDT continues to conduct boat-based photo-ID and land-based sightings surveys of various bottlenose dolphin groups occurring in Western Scotland. This is ongoing for 2005.

IFAW (www.ifaw.org/sotw) conducted an acoustic survey for sperm whales in the SW Mediterranean between 19th October and 25 November 2004 (including the Alboran Sea and north African waters, south of the Balearic Islands and east to Sardinia). The acoustic survey techniques involved automated detection and location of sperm whales using a two element towed hydrophone. Five species of cetacean were documented and photo-identification pictures of 6 sperm whales were collected.

IFAW also conducted an acoustic survey for harbour porpoises off SW Spain and NW Morocco, between Cadiz and the Canary Islands between 30th March and 9th April 2005. Acoustic detection rates will be compared to those collected recently in other European waters using the same equipment and techniques, to provide a measure of porpoise relative abundance. A sightings survey was also carried out for all species. The survey will continue during May, in conjunction with a sighting survey for monk seals (*Monachus monachus*) off SW Morocco (previously, Western Sahara)

In collaboration with the Brazilian National Institute of Amazonian Research (INPA), SMRU carried out daily boat-based surveys of botos and tucuxis in the Mamirauá Reserve, Brazil. This is a long-term study of marked and unmarked animals, looking at population biology and ecology.

Marine Awareness North Wales conducted line transect surveys of harbour porpoises around North Anglesey, 2002-2005. Analysis of the data gathered throughout the study period showed that a relatively high density of porpoise is found during the summer months. (Jones *et al.*, 2005).

Sea Watch Foundation (SWF) initiated line transect surveys in 2004 to estimate absolute abundance of short-beaked common dolphins in the Celtic Deep and St Georges Channel .

SWF (contact Fernando Ugarte) conducted line transect and opportunistic cetacean surveys in the Cardigan Bay SAC in 2004-2005. Preliminary estimates indicate that there were 0.49 porpoises/km² in the inshore waters.

SMRU has been conducting sightings and acoustic surveys of Chilean dolphins and Peale's dolphins off Chile (Sonja Heinrich, PhD study).

SMRU is coordinating the Small Cetaceans in the European Atlantic and North Sea (SCANS-II) project <http://biology.st-andrews.ac.uk/scans2/>. The project is funded by the European Life-Nature programme and 12 European governments. The project will generate precise and unbiased estimates of

abundance for the harbour porpoise and other cetaceans. The survey area includes western European continental shelf waters from 36°-62°N. Seven ships and three aircraft will survey the area between 27th June - 29th July 2005. A pilot survey to test methods, equipment and train cruise leader took place in April 2005 in the Kattegat and Danish Belts. The abundance estimates will contribute to the development of a management procedure to set safe bycatch limits for the harbour porpoise (contact: Kelly Macleod km53@st-andrews.ac.uk)

UAZD (Lighthouse Field Station) continued to conduct boat-based photo-ID surveys in Northeast Scotland for bottlenose dolphins. They also conduct land-based visual and acoustic studies of fine-scale behaviour and distribution of *Tursiops* and harbour porpoises in core areas within the Moray Firth SAC.

UAZD is carrying out small-scale systematic boat surveys and coastal surveys for bottlenose dolphins in and around Aberdeen, NE Scotland (contact: Sarah Canning: s.canning@abdn.ac.uk)

UAZD is carrying out regular surveys along fixed transect routes on the west coast of Scotland using passenger ferries as research platforms. This work aims to study factors that affect the fine-scale spatial and temporal distribution of cetacean species in this area, as well as investigating the structure of the cetacean community. Species studied include harbour porpoises, minke whales, common dolphins and bottlenose dolphins (contact: Sarah Bannon: s.bannon@abdn.ac.uk).

UMBSM in collaboration with Fundemar (Dominican Republic) is conducting surveys using line transect methodologies in the south western waters of the Dominican Republic, targeting, in particular bottlenose and spotted dolphins. Emphasis is being placed on estimating population numbers and areas of critical habitat, as well as the effects of anthropogenic disturbance on distribution and abundance. (including Alan Whaley, MSc/PhD study).

UMBSM is collaborating with the Centre for Excellence in Marine Biology, University of Karachi, and WWF-Pakistan in conducting surveys and monitoring the Sindh and Balochistan Coasts of Pakistan. The three year study on cetaceans is to determine the abundance, diversity and seasonal habitat use, assess the status of their pelagic environment and document threats to their populations. Species include the finless porpoise, humpback dolphin, fin whale and Bryde's whale (Mauvis Gore, Rupert Ormond, Chris Parsons)

UMBSM has been involved, with the Oman Whale and Dolphin Research Group, in work on the ecology and conservation of cetaceans in Oman, with particular reference to humpback whales (*Megaptera novaeangliae*) (Gianna Minton, PhD study)

UMBSM is carrying out a study on the behaviour and ecology of spinner dolphins, both in the Muscat region of Oman and in the Red Sea of Southern Egypt, with special reference to effects of anthropogenic interactions (Louisa Ponnampalam, PhD study).

UMBSM is monitoring numbers and species of cetaceans in the Firth of Clyde and Clyde Sea Area, through transects and observer network (Mauvis Gore, Clyde Cetacean Monitoring Programme).

WDCS conducted extended survey of Risso's dolphins, harbour porpoises and other cetaceans in Cardigan Bay, 2002-2005. Both land-based and boat-based survey techniques were used including acoustic porpoise detectors (or PODs)

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

Whale-watching vessels continue to be utilised as platforms of opportunity by HWDT.

Organisation Cetacea (ORCA) (www.orcaweb.org.uk) continues to conduct opportunistic surveys from ferries, primarily from Southern England to Northern Spain. All data contribute to ORCA's database, currently with over 3,500 effort-related cetacean sightings. Experienced observers are encouraged to collect distance-sampling data as on standard line transect surveys. The data is made available to a variety of conservation and education projects.

Throughout 2004-2005, and mainly from a dolphin-watching platform of opportunity, marine mammals in the Cardigan Bay SAC were counted by SWF (contact Fernando Ugarte) using photo-identification techniques. Based on the number of dolphins photo-identified, the minimum population size is 119. An estimate based on the number of well-marked animals identified, and their percentage in the population, suggest a total number of 138 bottlenose dolphins in the Cardigan Bay SAC.

SMRU has carried out passive acoustic surveys for sperm whales, dolphins and harbour porpoises on a number of Fishery Research Services (FRS) cruises. These cruises have covered the waters of the Faroe-Shetland, shelf waters west of Scotland from 56°N to 60°N. (contact Clare Embling: cbe2@st-andrews.ac.uk).

The SMRU has also been conducting visual and acoustic surveys of the cetacean fauna of the west of Scotland from several platforms of opportunity (Clare Embling, PhD Study).

UAZD has carried out opportunistic cetacean surveys on various ferry routes on the west coast of Scotland (contact Colin MacLeod)

UAZD is studying the distribution of sperm whales in the Northeast Atlantic using passive acoustic techniques onboard the FRV Scotia oceanographic cruises carried out by the FRS Marine Laboratory and in collaboration with SMRU (contact Sónia Mendes: s.mendes@abdn.ac.uk, Clare Embling: cbe2@st-andrews.ac.uk).

Also, UAZD is performing similar work in relation to beaked whales in association with JNCC. UAZD is also aiding in the compilation of a global database of beaked whale records (contact: Colin MacLeod: c.d.macleod@abdn.ac.uk).

2.2 Analyses/development of techniques

The CCW commissioned the Sea Watch Foundation in collaboration with Dr Graham Pierce, University of Aberdeen to analyse harbour porpoise sightings from the Joint Cetacean Database. Emphasis was placed upon whether the following criteria could be fulfilled: 1) the continuous or regular presence of the species (subject to seasonal variation); 2) high population density in relation to neighbouring areas; and 3) high ratio of young to adults during certain periods of the year. A number of areas were highlighted as having greater than average numbers of porpoises regularly present during an important period (April-September) in the annual cycle of the species, including west Wales (Evans & Wang, 2005).

SWF (Mick Baines) used spatial modelling (GAMs) of bottlenose dolphin and harbour porpoise distribution data in Cardigan Bay to investigate the significance of environmental variables as predictors of animal abundance.

SMRU (Caterina Fortuna, PhD study) has been analysing habitat preferences of bottlenose dolphins in Croatian waters, and habitat preferences of Chilean and Peale's dolphins in Chile (Sonjia Heinrich, PhD study).

SMRU (Leigh Hickmott, MRes study) is investigating the behaviour and foraging ecology of Blainville's beaked whale (*Mesoplodon densirostris*) and Cuvier's beaked whale (*Ziphius cavirostris*) beaked whales in the Northern Bahamas.

UAZD (Dr. Francesca Marubini, f.marubini@abdn.ac.uk) is applying spatial modelling to data from SWF and JNCC to investigate population dynamics and habitat preferences of the harbour porpoise in British waters.

UAZD (Colin MacLeod, c.d.macleod@abdn.ac.uk) is investigating the applicability of terrestrial niche-based modelling techniques that can be applied to non-effort related sightings data to cetacean research. This has included a comparison of the predictive abilities of different techniques to the distribution of harbour porpoises and modelling the distribution of beaked whales from eco-geographic variables on the Atlantic Frontier and throughout the North Atlantic and contiguous areas.

University of Wales Bangor (Rob Lott MSc study) investigated the social structure and ranging patterns of bottlenose dolphins in Cardigan Bay using photo-identification data.

3. Marking data

3.1 Field work

3.1.1 NATURAL MARKING DATA

Opportunistic photo ID is carried out for minke whales, bottlenose dolphins and killer whales by the HWDT throughout southwest Scotland.

Research on cetaceans was conducted around Iceland by IFAW in July and August 2004 under permit from the Government of Iceland, focusing mainly on the acoustics of large baleen whales. The vessel travelled 7757 km (4189 nautical miles) in Icelandic waters, spending around 700 hours at sea. In addition to the acoustic data, photo-identification images of 3 blue whales, 12 pilot whales and 22 sperm whale flukes were collected.

Sea Watch Foundation and Sea Trust are using photo-identification techniques to estimate absolute abundance of common dolphins in the Celtic Deep and St Georges Channel.

The SMRU is also conducting photo-identification studies of Chilean and Peale's dolphins in Chile, of humpback whales in the Gulf of Maine, and of bottlenose dolphins in the Azores under three studentships.

UAZD (Lighthouse Field Station) continued to collect photo-ID data in Northeast Scotland for bottlenose dolphins. These data have also been used to develop new Bayesian modelling frameworks for estimating abundance and abundance trends using capture-recapture analysis (contact Ross Corkrey), and to define the social structure of the population (contact David Lusseau).

UMBSM in collaboration with Fundemar (Dominican Republic) is compiling a photo-ID catalogue of cetaceans inhabiting the south-western waters of the Dominican Republic, targeting, in particular bottlenose and spotted dolphins, but humpback whales have also been sighted. Emphasis is being placed on estimating population numbers and building a catalogue of identifiable individuals to prevent and/or monitor further illegal catches of cetaceans from this area for captive dolphin facilities. Similarly, UMBSM is also compiling photo-IDs of spinner dolphins in the Red Sea area of southern Egypt, and cetaceans off the Sindh and Balochistan coasts of Pakistan.

WDCS conducted extended survey of Risso's dolphins, harbour porpoises and other cetaceans in Cardigan Bay, 2002-2005 using photographic identification.

Species	Feature	Area/stock	Calendar year/season no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
Bottlenose dolphin	Dorsal fin	Dominican Republic	2004-05	Y		Allan Whaley, UMBSM
Atlantic spotted dolphin	Dorsal fin	Dominican Republic	2004-05	Y		Allan Whaley, UMBSM
Humpback whale	Dorsal fin/Fluke	Dominican Republic (South)	2005	Y		Allan Whaley, UMBSM
Spinner dolphins	Entire body	Egypt (Red Sea)	2005	N		Rupert Ormond, UMBSM
Bottlenose dolphins	Dorsal fin	Pakistan	2005	N		Mauvis Gore, UMBSM
Cetaceans	Dorsal fin	Pakistan	2005	N		Mauvis Gore, UMBSM
Minke whales	Dorsal fin/body	SW Scotland	2005			HWDT
Bottlenose dolphin	Dorsal fin	SW Scotland	2005			HWDT
Killer whales	Dorsal fin/body	SW Scotland	2005			HWDT
Blue whales	Fluke	Iceland	2004			IFAW
Pilot whales	Dorsal fin	Iceland	2004			IFAW
Sperm whales	Fluke	Iceland	2004			IFAW
Chilean dolphins	Dorsal fin	Chile	2004-2005			Sonja Heinrich, SMRU

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Peale's dolphins	Dorsal fin	Chile	2004-2005			Sonja Heinrich, SMRU
Bottlenose dolphin	Dorsal fin	Moray Firth	2004-2005			David Lusseau, UAZD
Bottlenose dolphin	Dorsal fin/body	Aberdeen	2004-2005			Sarah Canning
Botos	Dorsal fin	Brazil	2004-2005 (c.85)			Tony Martin
Risso's dolphin	Dorsal fin + General colour patterns	Bardsey Island	2	Y	20	Whale & Dolphin Conservation Society
Bottlenose dolphin	Dorsal fin	Cardigan Bay	Over 15 year period but not continuous	Y	300	Sea Watch Foundation
Short-beaked common dolphin	Dorsal fin+ General colour patterns	Southern Irish Sea	1	Y	40	Sea Trust & Sea Watch Foundation

3.1.2. ARTIFICIAL MARKING DATA

None.

3.1.3 TELEMETRY DATA

None

3.2 Analyses/development of techniques

Nick Tregenza in conjunction with the Environment Agency and IFAW have conducted trials of continuous acoustic monitoring of Harbour Porpoises within and outside rias in SW England to detect year on year trends in encounter rates.

SMRU students have addressed the estimation of survival rate of bottlenose dolphins in the Sado Estuary, Portugal using mark-recapture analyses of photo-identification data, the estimation of abundance of humpback whales in the North Atlantic using mark-recapture analyses of photo-identification data and a quantification of mother-calf association patterns in bottlenose dolphins in NE Scotland using analyses of photo-identification data.

4. Tissue/biological samples collected

4.1 Biopsy samples

4.2 Samples from directed catches or bycatches

Species	Area/stock	Calendar year/season total	Archived (Y/N)	Tissue type(s)	Contact person/institute
Bottlenose dolphin	Galicia, NE Atlantic		N	Stomach content	cemma@arrakis.es ruthfenandez@uvigo.es
Harbour porpoise	North Sea	9	Y	Various	Paul Jepson (IoZ)
Common dolphin	Channel	3	N	Skin, tooth, blubber	Simon Northridge, SMRU

4.3 Samples from stranded animals

Species	Area/stock	Calendar year/season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Harbour porpoise	UK	156	Y	Various including teeth	Paul Jepson (IoZ), Richard Sabin (NHM)
Shortbeaked common dolphin	UK	46	Y	Various	Paul Jepson (IoZ), Richard Sabin (NHM)
Common Bottlenose dolphin	UK	5	Y	Various	Paul Jepson (IoZ)
Striped dolphin	UK	4	Y	Various	Paul Jepson (IoZ)
White-beaked dolphin	UK	3	Y	Various including skeletal material	Paul Jepson (IoZ), Richard Sabin (NHM)
Risso's dolphin	UK	3	Y	Various	Paul Jepson (IoZ)
Atlantic white-sided dolphin	UK	2	Y	Various	Paul Jepson (IoZ)
Pilot whale	UK	2	Y	Various	Paul Jepson (IoZ)
Sowerby's beaked whale	UK	2	Y	Various	Paul Jepson (IoZ)
Sperm whale	UK	1	Y	Various including	Paul Jepson (IoZ)

				skeletal material	
Fin whale	UK	1	Y	Various	Paul Jepson (IoZ)
Minke whale	UK	1	Y	Various	Paul Jepson (IoZ)
Long-finned pilot whale	Scotland	2	Y	Teeth (n=1), ovaries (n=1), stomach content	j.a.learmonth@abdn.ac.uk
Atlantic white-sided dolphin	Scotland	3	Y	Teeth (n=3), ovaries (n=1), testes (n=1)	j.a.learmonth@abdn.ac.uk
Atlantic white-beaked dolphin	Scotland	1	Y	Testes (n=1)	j.a.learmonth@abdn.ac.uk
Sowerby's beaked whale	Scotland	1	Y	Ovaries (n=1)	j.a.learmonth@abdn.ac.uk
Harbour porpoise	Scotland	19	Y	Teeth (n=19), ovaries (n=8), testes (n=5)	j.a.learmonth@abdn.ac.uk
Bottlenose dolphin	Scotland	1	Y	Stomach content (n=1)	j.a.learmonth@abdn.ac.uk
Bottlenose dolphin	Galicia, NE Atlantic	2000-2004	N	Stomach content	cemma@arrakis.es ruthfernandez@uvigo.es

4.4 Analyses/development of techniques

The IoZ, in collaboration with Cambridge University, has completed the generation of microsatellite genetic data from over 500 harbour porpoises found stranded in the UK between 1990 and 2003. This data is being used to investigate population structure in UK harbour porpoises and to investigate potential relationships between indices of inbreeding and disease susceptibility.

SMRU has carried out diet analysis work on harbour porpoises and common dolphins, using stomach contents obtained from both bycaught and stranded animals in England.

SMRU (Monica Silva) has been analysing mitochondrial and nuclear DNA to investigate population structure in bottlenose dolphins in the Azores archipelago.

UAZD has carried out diet analysis through the examination of stomach contents of all marine mammal species stranded and by-caught in Scotland. In addition, dietary information is also gathered from the analysis of the fatty acid composition of blubber samples (contact: M. Begoña Santos: m.b.santos@abdn.ac.uk and Jennifer Learmonth: j.a.learmonth@abdn.ac.uk).

UAZD is analysing the variation of stable isotopes of carbon and nitrogen across growth layers of male sperm whale teeth to make inferences on sperm whale dietary and migratory history in the North Atlantic. (contact: Sónia Mendes, s.mendes@abdn.ac.uk)

UAZD is also undertaking age determination using teeth samples and establishing reproductive status from gonad samples for various cetacean species stranded in Scotland (contact: Jennifer Learmonth: j.a.learmonth@abdn.ac.uk and Patricia Lastra: p.lastra@abdn.ac.uk)

UAZD is analysing bone samples from beaked whales from around the North Atlantic to investigate trophic and dietary ecology through stable isotope analysis (contact: Colin MacLeod: c.d.macleod@abdn.ac.uk).

UAZD is studying the importance of different sources of error in cetacean and pinniped diet analysis (sampling, sub-sampling, regression, otolith digestion, type of weighting applied to different stomachs, stratification of samples, use of hard parts other than otoliths, etc.) using bootstrap and computer simulations.

UAZD is also looking at ways of relating diet selection (in dolphins, porpoises and seals) to fish abundance using Redundancy Analyses to look at variability in dietary data in relation to year, season, sex, etc. and Generalised Additive Models to model the shape of the relationships.

5. Pollution studies

A case-control statistical analysis demonstrated that porpoises dying of infectious disease (n=82) had significantly higher levels of polychlorinated biphenyls (PCBs) than healthy porpoises that died of by-

catch and other forms of acute physical trauma (n=175). This association, which occurred independently of a range of potentially confounding variables including age and two quantitative indices of nutritional status, is consistent with the hypothesis that chronic PCB exposure impairs immune function resulting in individual (and possibly population) level effects (Jepson et al. 2005). These data may form the basis for future quantitative risk assessment analysis for PCB-induced mortality in harbour porpoise populations of known size and PCB exposure.

During 2004, data on polychlorinated biphenyls, organochlorine pesticides, butyltins and polybrominated diphenylethers was generated for 178 UK-stranded cetaceans comprising 148 harbour porpoises, 11 bottlenose dolphins (*Tursiops truncatus*), 9 Sowerby's beaked whales (*Mesoplodon bidens*), 5 killer whales (*Orcinus orca*), 2 pygmy sperm whales (*Kogia breviceps*), 1 northern bottlenose whale (*hyperoodon ampullatus*), 1 Cuvier's beaked whale (*Ziphius cavirostris*) and 1 Sei whale (*Balaenoptera borealis*) by the CEFAS Burnham Laboratory, Essex.

The BIOCET project (UAZD, in collaboration with various other groups) measured POP and toxic element levels in 250+ small cetaceans from the Atlantic coastline of Europe during 2001-04.

SMRU (Dr Sascha Hooker), is continuing to collaborate with Dr Hal Whitehead, Dalhousie University, Canada, Dr Michael Moore, Woods Hole Oceanographic Institution, and Drs Chris and Tracy Metcalfe, Trent University, Canada, in a study of contaminant levels of northern bottlenose whales in the Gully, eastern Canada.

6. Statistics for large cetaceans

6.1 Direct catches - Not applicable to UK

6.2 Other non-natural mortality for the calendar year 2004

Species	Area/stock	Males	Females	Total	Cause	Methodology
Fin whale (<i>Balaenoptera physalus</i>)	NE Atlantic	1		1	Ship strike	Post Mortem
Minke whale (<i>B. acutus</i>)	NE Atlantic			1	Possible Bycatch	Observation

6.2.1 STRANDINGS OR DEAD WHALES ENCOUNTERED AT SEA

None

6.2.2 OBSERVED OR REPORTED SHIP STRIKES

Whale species	Sex	Date	Location	Vessel Type	Speed	Fate	Source or contact
Fin whale	Male	20/7/04	Mid-Atlantic	Large Cargo	U	D	Paul Jepson
Comment: recovered from bow of container vessel in Liverpool harbour (see Liverpool Echo, 21 July 2004) that had travelled from Canada.							

6.2.2 FISHERY BYCATCH

Whale species	Sex	Date	Location	Fate	Targeted fish species	Gear	How observed	Source or contact
Minke whale?	U	7/4/2004	50°N 4°W	U	Bass	PTM	F	Simon Northridge
Comment: Large animal observed at a distance in the net of another boat. Assumed to be minke whale, fate unknown.								

6.3 Earlier years' statistics

None

7. Statistics for small cetaceans

7.1 For the calendar year 2004

Species	Area/stock	Directed catch		Incidental mortality			Live-capture
		Reported	Est. total	Reported	Est. total	Source	Reported
Harbour porpoise	UK			37		Stranded/necropsy	
Short-beaked common dolphin	UK			32	-	Stranded/necropsy	
Harbour Porpoise	North Sea – UK			11	(none yet)	North Sea tangle nets	
Short-beaked common dolphin	NE Atlantic – UK			185	439 (379-512)*	Bass pair trawl fishery	
Risso's dolphin	UK			1		Stranded/necropsy	
Bottlenose dolphin	Galicia, NE Atlantic			1		Fishery interaction	
Harbour porpoise	Firth of Clyde, UK			5		stranded	0

* Estimate based on fishery observer records and *preliminary* assessment of total fleet effort for the 2003-2004 season.

7.2 Earlier years' statistics

None to report

8. Strandings

The IoZ (with assistance from NHM) and SACVSD are contracted by Defra to investigate diseases and causes of death in marine mammal (mainly cetacean) strandings in the UK. IoZ and SACVSD maintain national databases and tissue archives derived from those UK stranded animals that have been necropsied.

In addition to the strandings co-ordination funded by Defra, the National Assembly for Wales is funding the Welsh Strandings Co-ordinator in conjunction with the Countryside Council for Wales (CCW), who collaborates with the IoZ/SACVSD/NHM scheme, while The Cornwall Wildlife Trust also maintains its own strandings database, with information that also goes to the NHM.

The NHM have collected records on all stranded cetaceans found on the coasts of the United Kingdom, since 1913. The NHM maintains a national strandings database, and has retrospectively entered all strandings data gathered since 1913. The NHM collects skeletal material, parasites, stomach contents and tissue samples from animals stranded in the UK and makes these available through its national research collections. The NHM has begun to place searchable, limited datasets on its Cetacean Strandings website.

UAZD have attended a few strandings: i.e. Mesoplodon in Peterhead and harbour porpoises in Aberdeen

9. Other studies and analyses

Ceredigion County Council, supported by the Countryside Council for Wales (CCW), reported on a 10 year study of cetacean site use and boat traffic along the Marine Heritage Coast and Cardigan Bay cSAC in 2004 (Pierpoint and Allen, 2004).

A study (IoZ/SACVSD) reporting in detail the pathological descriptions of a range of acute and chronic cavitory lesions associated with *in vivo* gas bubble/emboli formation in 10 individually-stranded cetaceans in the UK (Jepson *et al.* 2005). The cases were most prevalent among deep diving species such as beaked whales and Risso's dolphins (*Grampus griseus*). Although the cause of these lesions is not known, decompression-related off-gassing of nitrogen supersaturated tissues or embolization of intestinal gas are suspected. The lesions demonstrate that fatal *in vivo* gas bubbles/emboli can form in cetacean tissues and persist over time. In addition to these 10 cases, three additional cases were

identified in the UK in 2004 comprising a Sowerby's beaked whale (*Mesoplodon bidens*), a common dolphin (*Delphinus delphis*) and a harbour porpoise (*Phocoena phocoena*).

An IoZ study reporting the developmental stages of the testis of UK-stranded harbour porpoises using immunohistochemical techniques was published in 2004 (Holt et al. 2004). In addition to defining stages of testicular development, the qualitative and quantitative indices of development described may form the basis of future studies investigating potential endocrine disrupting effects of chemical contaminants.

Nick Tregenza has conducted sea tests of a truly alerting device i.e. a non-aversive pinger to reduce harbour porpoise bycatch and results show these devices display high rates of alerting in a wide range of conditions.

SMRU (Vincent Janik) has been conducting playback studies on bottlenose dolphins in Sarasota Bay, Florida in collaboration with Randy Wells from the Mote Marine Lab and Laela Sayigh from the University of North Carolina at Wilmington. They tested whether artificial dolphin whistles elicit the same responses as original recordings of dolphins. This study is ongoing and investigates whether identity information is carried in the frequency modulation of a whistle or in general voice features of the individual. Vincent Janik is also conducting experiments along the East coast of Scotland, using a hydrophone arrays to study functional aspects of bottlenose dolphin communication. This work involves several students who also collect Photo-ID data on bottlenose dolphins and sighting data of harbour porpoises.

SMRU (Luke Rendell) is conducting research on the vocal behaviour and vocal clans of sperm whales, and their relation to population structure. The research aims to investigate the genetic relationships between vocal clans in the South Pacific, to study vocal variation in other areas, particularly the western Mediterranean and to understand fine-scale details of vocal behaviour using acoustic localization techniques in the West Atlantic

SMRU in conjunction with HWDT, Scottish Sea Farms and SHN is conducting a small-scale study to investigate the use of seal scarers on fish farms in relation to porpoise distribution in the Sound of Mull using passive acoustic techniques (T-PODs).

SMRU has been investigating the incidental capture of common dolphins in a pelagic trawl fishery, and are developing mitigation measures. SMRU is also investigating what factors control the bycatch of porpoises in gill and tangle net fisheries in the North Sea.

UAZD have contributed to a DEFRA-funded project on climate change and migratory species, including reviewing effects of climate change on cetaceans (contact: Jennifer Learmonth j.a.learmonth@abdn.ac.uk)

UAZD is studying the seasonal and geographical segregation in northern latitudes of male sperm whales once they leave their natal groups using sperm whale catch data (1922-82) provided by the IWC. (contact: Sónia Mendes, s.mendes@abdn.ac.uk)

UAZD (Lighthouse Field Station) are studying the impacts of the construction of a demonstration windfarm on bottlenose dolphins and harbour porpoises in the Moray Firth.

UAZD is also involved in studies of whale watching impacts on the behaviour of northern resident killer whales in collaboration with the University of Washington and Rob Williams (SMRU). In addition, in collaboration with Rob Williams (SMRU), they have developed models using association data from northern resident killer whales to understand the effects of live capture programmes on killer whale societies (contact David Lusseau).

UAZD (Lighthouse Field Station) have been developing a game-theory model to analyse the effect of prey spatio-temporal variability on foraging strategies, mobility and distribution of bottlenose dolphins. (contact Claire Cadet)

UMBSM (& George Mason University, US) are conducting a questionnaire survey on levels of tourist awareness of, and interest in, dolphin-watching opportunities, and concerns for the sustainability of whale-watching, in Bayahibe and La Romana, Dominican Republic.

UMBSM is also using questionnaires to survey public attitudes towards cetaceans in the Firth of Clyde and Clyde Sea Area (Lyndsay Hemphill).

The SMRU (contact Patrick Miller pm29@st-andrews.ac.uk) is also participating in CARP (Cachalot Assessment Research Plan.) At this meeting, the current status of scientific research on sperm whales was reviewed and a priority research plan was outlined to assess the global status of sperm whales.

Whale-watching

UMBSM (& George Mason University, US) are conducting a questionnaire survey on levels of tourist awareness of, and interest in, dolphin-watching opportunities, and concerns for the sustainability of whale-watching, in Bayahibe and La Romana, Dominican Republic.

UMBSM is also using questionnaires to survey public attitudes towards cetaceans in the Firth of Clyde and Clyde Sea Area (Lyndsay Hemphill).

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APPENDIX: ORGANISATIONS/INDIVIDUALS AND CONTACT DETAILS

- Ceredigion County Council, Aberaeron SA460PA.
Liz Allen, liza@ceredigion.gov.uk
- Cornish Wildlife Trust, c/o Nick Tregenza, Beach Cottage, Beach Terrace, Long Rock, Penzance, Cornwall, TR20 8JE
Nick Tregenza, nick@cheloniamon.co.uk (44)1736 711783
- Countryside Council for Wales, Maes-y-Ffynnon, Penrhosgarnedd, Bangor, Gwynedd LL57 2DW.
Mandy McMath m.mcmath@ccw.gov.uk (44) 1248 385658
- Durlston Marine Project, Durlston Country Park, Swanage, Dorset BH19 2JL
Cathryn Owens, cathryndmp@aol.com, (44)1929 421111
- Friends of Cardigan Bay, Bronafon, Llanafan, Aberystwyth SY23 4AY.
Peter Smart, pictureplane@mid-wales.net
- Hebridean Whale and Dolphin Trust, 28 Main Street, Tobermory, Isle of Mull, Argyll PA75 6NU
Juliet Shrimpton research@hwdt.org, (44) 1688 302728
- Institute of Zoology, Regent's Park, London, NW1 4RY
Paul Jepson, paul.jepson@ioz.ac.uk, (44) 171 449 6691
- International Fund for Animal Welfare, 89-90 Albert Embankment, London, SE1 7UD, UK
*Anna Moscrop, amoscrop@ifaw.org
Russell Leaper, russell@ivytdemon.co.uk (44) 139 777 2544*
- Joint Nature Conservation Committee, 7 Thistle Place, Aberdeen, AB10 1UZ
Jim Reid jim.reid@jncc.gov.uk , (44) 1224 655702
- Marine Awareness North Wales, 31 Upper Garth Road, Bangor, Gwynedd LL57 2SR.
George Stoye, george@wiss.co.uk
- Marine Environmental Monitoring, Penwalk, Llechryd, Cardigan, Ceredigion SA43 2PS.
Rod Penrose, rodpenrose@cix.co.uk
- Millport Large Marine Vertebrate Group, University Marine Biological Station Millport, KA28 0EG Isle of Cumbrae, Scotland
Mauvis Gore, Mauvis.Gore@millport.gla.ac.uk (+44)1475 530 581
- Natural History Museum, Cromwell Road, London, SW7 5BD.
Richard Sabin, rsc@nhm.ac.uk, (44) 20 7942 5206 / 5155
- Scottish Agricultural College, Veterinary Sci Division, Wildlife Div., Drummondhill, Stratherrick Road, Inverness, IV2 4JZ
Bob Reid, WildlifeUnit@ed.sac.ac.uk, (44) 1463 243 030
- Scottish Association for Marine Science Dunstaffnage Marine Laboratory, Oban, Argyll, PA37 1QA SCOTLAND
Ben Wilson Ben.Wilson@sams.ac.uk 44(0) 1631 559 346
- Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, St. Andrews, Fife, KY16 8LB
*Tony Martin, arm@bas.ac.uk (44) 1223 221246
Phil Hammond, psh2@st-andrews.ac.uk, (44) 1334 463222
Simon Northridge, spn1@st-andrews.ac.uk (44) 1334 462630*
- Sea Trust South and West Wales, Tynewydd, Goodwick, Pembrokeshire SA64 OJY.
Cliff Benson, fred@sjacob.fnet.co.uk
- Sea Watch Foundation, 11 Jersey Road, Oxford, OX4 4RT.
Peter Evans peter.evans@zoo.ox.ac.uk, (44) 1865 717276
- University of Aberdeen, Dept. of Zoology, Tillydrone Avenue, Aberdeen AB9 2TN
Graham Pierce, g.j.pierce@abdn.ac.uk, (44) 1224 272459

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University of Aberdeen Department of Zoology, Lighthouse Field Station, George Street, Cromarty, Ross-shire
IV11 8YJ *Paul Thompson, nhi519@abdn.ac.uk, (44) 1381 600 548*

University of Wales Bangor, Institute of Environmental Science, Robinson Building, Deiniol Road, Bangor,
Gwynedd LL57 2UW.
John Goold, j.c.goold@bangor.ac.uk

University Marine Biological Station Millport, Cumbrae. c/o *Chris Parsons* as HWDT above

Whale and Dolphin Conservation Society, Brookfield House, 38 St. Paul St., Chippenham, Wiltshire SN15 1LY.
Mark Simmonds, mark.simmonds@wdcs.org