

UK Progress report on cetacean research, May 2010 to May 2012 (2 years), with statistical data for the calendar years 2010 and 2011

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To collate this report, 43 requests were circulated to organizations and scientists around the UK. Some of the circulations elicited no response, others resulted in inputs being received from other organizations and scientists, and some inputs contained data from several organizations. Ultimately, however, 24 sets of information were received and are collated in the document that follows. Note that the ASCOBANS reports for the two years covered by this collation gives fuller detail on many of the topics discussed here, but that virtually all topics in the ASCOBANS reports are highlighted briefly in one of the sections below. The main organizations and persons responsible for the information behind the inputs to this report are listed in the Table below.

Name of agency/institute	Abbreviation	Contact e-mail address
Aberdeen University Lighthouse Field Station	AULFS	Paul Thompson: lighthouse@abdn.ac.uk
Centre for Environment, Fisheries and Aquaculture Science	Cefas	Robin Law: robin.law@cefaz.co.uk
Centre for Research into Ecological and Environmental Modelling, University of St Andrews	CREEM	Catriona Harris: catriona@mcs.st-and.ac.uk
Cetacean Research and Rescue Unit, Banff	CRRU	Kevin Robinson: kev.robinson@crru.org.uk
Cornwall Wildlife Trust	CWT	Tom Hardy: tom.hardy@cornwallwildlifetrust.org.uk
Countryside Council for Wales	CCW	Mandy McMath: m.mcmath@ccw.gov.uk
Hebridean Whale and Dolphin Trust	HWDT	Nienke van Geel and Olivia Harries: biodiversityofficer@hwdt.org
Independent consultant funded by IFAW		Russell Leaper: russell@ivytdemon.co.uk
Institute of Zoology	IoZ	Rob Deaville: rob.deaville@ioz.ac.uk
International Fund for Animal Welfare	IFAW	Vassili Papastavrou: vpapastavrou@ifaw.org
Joint Nature Conservation Committee	JNCC	Eunice Pinn: eunice.pinn@jncc.gov.uk Mark Tasker: mark.tasker@jncc.gov.uk
Marine Environmental Monitoring	MEM	Rod Penrose: rodpenrose@strandingsdemon.co.uk
Marine Scotland Marine Planning and Policy	MSMPP	Elaine Tait: Elaine.Tait@scotland.gsi.gov.uk
National Museums Scotland	NMS	Zena Floody: Z.Floody@nms.ac.uk
Natural History Museum	NHM	Brian Smith: brian.smith@nhm.ac.uk
Oceanlab, University of Aberdeen	OCEANLAB	Graham Pierce: g.j.pierce@abdn.ac.uk
Scottish Agricultural College, Veterinary Services Division	SAC	Bob Reid: bob.reid@sac.co.uk Andrew Brownlow: andrew.brownlow@sac.co.uk
Scottish Association for Marine Science	SAMS	Ben Wilson: ben.wilson@sams.ac.uk
Sea Mammal Research Unit, Scottish Oceans Institute, University of St Andrews	SMRU	Simon Northridge: spn1@st-andrews.ac.uk
Sea Watch Foundation	SWF	Peter Evans: peter.evans@bangor.ac.uk
UK Cetacean Strandings Investigation Programme	CSIP	Rob Deaville: rob.deaville@ioz.ac.uk
University of Aberdeen Lusseau Laboratory (Complex Adaptive System Observational Research group)	AUCASIOR	David Lusseau: d.lusseau@abdn.ac.uk
University Marine Biological Station, Millport, Scotland	Earthlink	Chris Parsons: ecm-parsons@earthlink.net
Whale and Dolphin Conservation Society	WDSCS	Sarah Dolman: sarah.dolman@wdcs.org Sonja Eisfeld: sonja.eisfeld@wdcs.org

1. SPECIES AND STOCKS STUDIED

IWC common name	IWC recommended scientific name	Area/stock(s) - including	Items referred to
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Northeast Atlantic	4.3
Blainville's beaked whale	<i>Mesoplodon densirostris</i>	Northeast Atlantic	2.2
Blue whale	<i>Balaenoptera musculus</i>	Northeast Atlantic	2.2
Bottlenose dolphin	<i>Tursiops truncatus</i>	Northeast Atlantic, Celtic Sea; North Sea, Moray Firth; Scottish west coast (Hebrides)	2.1.1; 2.1.2; 2.2; 3.1; 3.1.1; 3.2; 4.3; 8
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Scottish west coast (Hebrides), NE Atlantic	4.3; 8
Fin whale	<i>Balaenoptera physalus</i>	Northeast Atlantic; Scottish west coast (Hebrides)	2.1.1; 2.1.2
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Northeast Atlantic	4.3

Harbour porpoise	<i>Phocoena phocoena</i>	Northeast Atlantic, North Sea and Celtic Sea; Scottish west coast (northeast Lewis and Gairloch; Hebrides)	2.1.1; 2.1.2; 2.2; 4.3, 8; 9
Indo-Pacific humpback dolphin	<i>Sousa chinensis</i>		3.1.1
Irrawaddy dolphin	<i>Orcaella brevirostris</i>		3.1.1
Killer whale	<i>Orcinus orca</i>	Northeast Atlantic; Scottish west coast (Hebrides)	2.1.2; 2.2; 3.2; 4.3; 8
Long-finned pilot whale	<i>Globicephala melaena</i>	Northeast Atlantic	4.3
Minke whale	<i>Balaenoptera acutorostrata</i>	Northeast Atlantic; Scottish west coast (Hebrides, northeast Lewis and Gairloch)	2.1.1; 2.1.2; 2.2; 3.1.1; 3.2; 4.3; 9
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	Northeast Atlantic	4.3
Pilot whale	<i>Globicephala melas</i>	Northeast Atlantic; Scottish west coast (Hebrides)	8
Pygmy sperm whale	<i>Kogia breviceps</i>	Northeast Atlantic; Scottish west coast (Hebrides)	4.3; 8
Risso's dolphin	<i>Grampus griseus</i>	Scottish west coast (northeast Lewis); Northeast Atlantic (Celtic Sea)	2.1.1; 4.3
Risso's dolphin	<i>Grampus griseus</i>	Northeast Atlantic (Celtic Sea), and Scottish West Coast (Hebrides)	2.1.1; 2.1.2; 3.1; 3.1.1; 3.2; 4.3; 8
Short-beaked common dolphin	<i>Delphinus delphis</i>	Northeast Atlantic; Scottish west coast (Hebrides and northeast Lewis)	2.1.1; 2.1.2; 2.2; 3.1; 3.1.1; 4.3; 4.4; 8
Sowerby's beaked whale	<i>Mesoplodon bidens</i>	Northeast Atlantic	4.3; 8
Sperm whale	<i>Physeter macrocephalus</i>	Scottish west coast (Hebrides), NE Atlantic	2.1.2; 2.2; 4.3; 8
Striped dolphin	<i>Stenella coeruleoalba</i>	Northeast Atlantic	4.3
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	Scottish west coast (Hebrides)	2.1.1; 2.1.2; 2.2; 3.1; 3.1.1; 3.2; 4.3; 8

The CRRU continued to conduct systematic surveys of the southern outer Moray Firth in northeast Scotland between May and October. During the years covered by this report, studies again concentrated primarily on coastal minke whales, bottlenose dolphins and harbour porpoises, although opportunistic encounters with other cetacean species (Risso's dolphins, common dolphins, killer whales, humpback whales, etc), turtles and basking sharks were also recorded.

2. SIGHTINGS DATA

2.1 Field work

2.1.1 Systematic

Target species	Date	Area	No. of sightings	Contact person/institute and references
Bottlenose dolphin	Jun-Sept 2011	Aberdeen harbour	32 (effort: 45 3-h sessions)	David Lusseau/AUCASrOR
Bottlenose dolphin	25/09 – 17/10/2010	Bardsey Island, Pen Llyn a'r Sarnau	5 (land); 1 (boat)	Sonja Eisfeld/WDCS
Bottlenose dolphin	May-October 2010	Moray Firth, Scotland	278 (Spey Bay)	Sarah Dolman/WDCS
Bottlenose dolphin	6/8-1/10/11	Scottish west coast	1 (land)	Sarah Dolman/WDCS
Bottlenose dolphin	May-October 2011	Moray Firth, Scotland	264 (Spey Bay), 167 (North Kessock)	Sarah Dolman/WDCS)
Bottlenose dolphin	31/03/2010 – 30/09/2010	Scottish west coast (Hebrides)	2	Nienke van Geel/HWDT
Bottlenose dolphin	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	2	Olivia Harries/HWDT
Bottlenose dolphin	17/8/10-27/9/10	Moray Firth	26	Paul Thompson/AULFS

Common dolphin	10/8-3/9/2010	Scottish west coast (northeast Lewis)	5 (land); 1 (boat)	Sarah Dolman/WDCS
Common dolphin	6/8-1/10/11	Scottish west coast	2 (land); 4 (boat)	Sarah Dolman/WDCS
Common dolphin	17/8/10-27/9/10	Moray Firth	6	Paul Thompson/AULFS
Fin whale	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	1	Olivia Harries/HWDT
Fin or sei whale	6/8-1/10/11	Scottish west coast	1 (land)	Sarah Dolman/WDCS
Harbour porpoise	Summer 2010	Kyle Rhea, West of Scotland	140	Ben Wilson/SAMS
Harbour porpoise	10/8-3/9/2010 9-14/10/2010 8-9/4/2011	Scottish west coast (northeast Lewis and Gairloch)	38 (Lewis, land); 11 (boat); 23 (Gairloch, land) 4 (Gairloch, land)	Sarah Dolman/WDCS
Harbour porpoise	25/09 – 17/10/2010	Bardsey Island, Pen Llyn a'r Sarnau	349 (land); 3 (boat)	Sonja Eisfeld/WDCS
Harbour porpoise	6/8-1/10/11	Scottish west coast	12 (land); 36 (boat)	Sarah Dolman/WDCS
Harbour porpoise	03/09 – 04/10/11	Bardsey Island, NW Wales	6 (land)	Sonja Eisfeld/WDCS
Harbour porpoise	31/03/2010 – 30/09/2010	Scottish west coast (Hebrides)	284	Nienke van Geel/HWDT
Harbour porpoise	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	341	Olivia Harries/HWDT
Harbour porpoise	17/8/10-27/9/10	Moray Firth	230	Paul Thompson/AULFS
Minke whale	10/8-3/9/2010 9-14/10/2010	Scottish west coast (northeast Lewis and Gairloch)	45 (Lewis); 4 (Gairloch, land)	Sarah Dolman/WDCS
Minke whale	6/8-1/10/11	Scottish west coast	5 (land); 1 (boat)	Sarah Dolman/WDCS
Minke whale	31/03/2010 – 30/09/2010	Scottish west coast (Hebrides)	38	Nienke van Geel/HWDT
Minke whale	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	67	Olivia Harries/HWDT
Minke whale	17/8/10-27/9/10	Moray Firth	14	Paul Thompson/AULFS
Risso's dolphin	10/8-3/9/2010	Scottish west coast (northeast Lewis)	7 (land); 9 (boat)	Sarah Dolman/WDCS
Risso's dolphin	25/09 – 17/10/2010	Bardsey Island, Pen Llyn a'r Sarnau	7 (land)	Sonja Eisfeld/WDCS
Risso's dolphin	6/8-1/10/11	Scottish west coast	4 (land); 3 (boat)	Sarah Dolman/WDCS
Risso's dolphin	03/09 – 04/10/11	Bardsey Island, NW Wales	25 (land), 5 (boat)	Sonja Eisfeld/WDCS
Risso's dolphin	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	2	Olivia Harries/HWDT
Risso's dolphin	17/8/10-27/9/10	Moray Firth	1	Paul Thompson/AULFS
Short-beaked common dolphin	31/03/2010 – 30/09/2010	Scottish west coast (Hebrides)	44	Nienke van Geel/HWDT
Short-beaked common dolphin	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	44	Olivia Harries/HWDT
White-beaked dolphin	31/03/2010 – 30/09/2010	Scottish west coast (Hebrides)	12	Nienke van Geel/HWDT
White-beaked dolphin	30/03/2011 – 30/09/2011	Scottish west coast (Hebrides)	27	Olivia Harries/HWDT
White-beaked dolphin	17/8/10-27/9/10	Moray Firth	2	Paul Thompson/AULFS

AUCAS^TOR carried out land-based surveys at Aberdeen Harbour, investigating the foraging ecology of bottlenose dolphins in the area.

WDCS conducted land- and boat-based surveys from northeast Lewis on the west coast of Scotland (including the Hebrides) between 10 August and 3 September 2010 and during August and September 2011, and land-based surveys from Gairloch between 9 and 14 October 2010 and between 8 and 9 April 2011. Visual sightings of cetaceans, pinnipeds, basking sharks and sunfish were also recorded. Passive acoustic data were collected using C-PODs between July and September 2011 on northeast Lewis.

WDCS also conducted land-based abundance surveys for harbour porpoise and Risso's and bottlenose dolphins, and boat-based photo-identification surveys of Risso's dolphins around Bardsey Island and Pen Llyn a'r Sarnau (Wales) in September/October 2010 and September 2011.

Monitoring of bottlenose dolphin and harbour porpoise was undertaken in Cardigan Bay and Pen Llyn a'r Sarnau Special Areas of Conservation under SWF contract to the Countryside Council for Wales (CCW). Management advice was provided to CCW and the local county councils.

The WDCS Shorewatch Programme trained local volunteers to conduct land-based watches for cetaceans from specific sites around the Scottish coast. Each watch consisted of 10 min of effort using 7×50 binoculars. Listed in this report are sightings from core sites, where a minimum of 60 watches per month was recorded.

The CRRU continued to conduct systematic surveys of the southern outer Moray Firth in northeast Scotland between May and October. During the years covered by this report, studies again concentrated primarily on coastal minke whales, bottlenose dolphins and harbour porpoises, although opportunistic encounters with other cetacean species, turtles and basking sharks were also recorded.

AULFS carried out aerial line transect surveys in the central Moray Firth in August and Sept 2010 as part of a study for DECC on the impact of oil and gas exploration. AULFS also carried out systematic passive acoustic studies at over 60 sites across the Moray Firth. Studies at a core-selection of these sites continue to be made year-round, with broader scale studies focusing on the summer period (see <http://og.decc.gov.uk/assets/og/environment/mf-results2.pdf>)

During September and October 2010, a month-long acoustic and visual survey primarily for beaked whales took place from the RV "Song of the Whale" owned by IFAW, off the west coast of Ireland and Scotland along the continental shelf edge. This was with core funding from IFAW and in collaboration with the IWDG and supporting funds from the Irish Government's Petroleum Affairs Division, Department of Communications, Marine and Natural Resources. The survey was planned to cover various areas of interest for beaked whales (deep gulleys, canyons and the shelf edge), and 6000 km of track line were surveyed in total. Because of inclement weather, planned tracks were cut short in autumn, but were completed in March 2011. Detections and sightings of large whales included fin, minke and sperm whales, and there were several acoustic detections of beaked whales although no confirmed sightings. Contact: Anna Moscrop, Marine Conservation Research, amoscrop@mcr-team.co.uk, report available from www.marineconservationresearch.co.uk/downloads/

From 24 May to 15 June 2011 a visual and acoustic survey was conducted for harbour porpoises between Ramsgate, Kent, at the eastern end of the English Channel and just beyond the Isles of Scilly to the west. With funding from IFAW, and working with French and UK partner groups, the survey covered >4000 km in two survey blocks (eastern and western Channel). Despite challenges with poor weather conditions and shipping noise in the busy shipping lanes, porpoises and several other species of small cetacean were reported during the survey confirming the presence of porpoises in the eastern Channel. Contact: Anna Moscrop, Marine Conservation Research, amoscrop@mcr-team.co.uk, report available from www.marineconservationresearch.co.uk/downloads/

In November 2011, a 20-day visual and acoustic survey for harbour porpoises on the Dogger Bank, southern North Sea, and surrounding waters was conducted. With core funding from IFAW and supporting contributions from Ascobans, the Dutch group Wageningen IMARES and WWF UK, 3229 km of survey track were completed across three survey blocks covering Dutch, German, Danish and UK waters of the North Sea. Contact: Anna Moscrop, Marine Conservation Research, amoscrop@mcr-team.co.uk, report available from www.marineconservationresearch.co.uk/downloads/

Earthlink is currently working on photo-ID of bottlenose dolphins in the Dominican Republic and rough-toothed and spotted dolphins in Aruba. They are also conducting whale-watching research in the Dominican Republic (specifically for humpback whales) and at Virginia Beach (humpback, right and fin whales).

A study was undertaken in West Wales examining long-term trends in recreational boat activity in relation to trends in bottlenose dolphin sightings rates. Areas with the highest densities of boat traffic experienced declines in bottlenose dolphin sightings rates.

A risk analysis of vessel strike was undertaken throughout the ASCOBANS Agreement Area using VOS ship data and effort-related cetacean sighting rates derived from multiple data sources (including SCANS II & CODA), found highest potential overlap between cetaceans (particularly large whales) and vessels in the Bay of Biscay.

Land-based effort-related watches were conducted at sites around the UK as part of SWF's national observer network that has been running since the 1970s. Surveys using a mixture of chartered vessels and platforms of

opportunity were undertaken (some in collaboration with other bodies) in the central North Sea, inshore waters of East Scotland, Northern Isles, Hebrides, and Irish Sea. Regional analyses/reviews were undertaken for the Thames Estuary region, the Grampian region, Orkney, and the Irish Sea.

Annual monitoring of bottlenose dolphin and harbour porpoise populations continued in Cardigan Bay, West Wales using photo-ID (bottlenose dolphin) and line transect survey (both species). After earlier (2001-07) increases, abundance estimates of the bottlenose dolphin population of Cardigan Bay Special Area of Conservation show a general decline. In 2011, the overall Cardigan Bay abundance estimate for bottlenose dolphin was 296 (CV=28.8) and for harbour porpoise was 990 (CV=27.1), from line transect surveys. Life history parameters measured from photo-ID for bottlenose dolphin indicate a mean annual birth rate of between 5.2% and 7.7% (2001-11) depending upon whether a closed or open population model is adopted; an inter-calf interval ranging from 2-5 years, with 3 years being the most common; and calf mortality rates of 20.4% (year 1), 24.5% (year 2), and 10.2% (year 3). Bottlenose dolphins from Cardigan Bay disperse in winter and generally move northwards in November to waters between Anglesey and the Isle of Man (and probably beyond) where they largely remain until the following April. Acoustic studies using T-PODs and C-PODs have been undertaken between 2009-12 (Hanna Nuuttila, PhD student, University of Bangor), extending other acoustic monitoring and research by SWF within Cardigan Bay SAC.

SWF holds Photo-ID catalogues for the following species: minke whale, humpback whale, killer whale, bottlenose dolphin, and Risso's dolphin, with small numbers of ID images (<20 per species) also for fin whale, short-beaked common dolphin, and white-beaked dolphin. Additions were made to all these catalogues during 2011, and several publications have resulted from analyses of photo-ID data.

Habitat modelling and spatial analyses were undertaken by SWF on various species: harbour porpoise, bottlenose dolphin, and minke whale.

Studies and recommendations for methodologies for monitoring and surveillance were also undertaken under the auspices of SWF.

2.1.2 Opportunistic, platforms of opportunity

Primary species	Area	Data type/method	Collected by	Platform	Location of archive (if applicable)	Contact person/institute and refs
All cetaceans (see above)	Isle of Mull and surroundings	Photo-ID, sightings, survey effort, environmental data	Crew	Whale watching vessel	HWDT	Nienke van Geel/HWDT
All cetaceans (see above)	Scottish west coast (Hebrides)	Community sightings network → sightings, photo-ID	Crew, naturalists, fisher	Wider community (e.g. residents, wildlife operators, fish boats, visitors)	HWDT	Nienke van Geel/HWDT
All cetaceans (see above)	Isle of Mull and surroundings	Photo-ID, sightings, survey effort, environmental data	Crew	Whale watching vessel	HWDT	Olivia Harries/HWDT
All cetaceans (see above)	Scottish west coast (Hebrides)	Community sightings network → sightings, photo-ID	Crew, naturalists, fisher	Wider community (e.g. residents, wildlife operators, fish boats, visitors)	HWDT	Olivia Harries/HWDT

The SMRU continued to collect at-sea observational records of live cetaceans during fishery monitoring; >550 sightings of ~4400 individual cetaceans have been reported since 1996.

2.2 Analyses/development of techniques

Target species	Date	Area	Methods/effort	Parameters/ factors measured	Contact person/institute; refs
Bottlenose dolphin	2008-present	Scottish west coast (Hebrides)	Photo identification and sightings data	Distribution, abundance and population structure	Paul Thompson (HWDT/ University of Aberdeen)
Harbour porpoise	Summer 2010	West of Scotland	Line transect survey	Distribution; sighting frequency	Ben Wilson/SAMS

Harbour porpoise	2008-2009	Scottish west coast (Hebrides)	Line transect visual and acoustic surveys	Distribution; sighting frequency	Clare Embling (HWDT/University of Aberdeen)
Harbour porpoise	2009-2010	Scottish west coast (Hebrides)	Line transect visual and acoustic surveys	Distribution; sighting frequency	Cormac Booth (HWDT/SMRU). As part of PhD research
Harbour porpoise	2009-2010	Scottish west coast (Hebrides)	Acoustic surveys	Measures of acoustic deterrent devices	Simon Northridge (HWDT/SMRU/SARF)
Harbour porpoise	2008-2009	Scottish west coast (Hebrides)	Line transect visual and acoustic surveys	Distribution; density; sighting frequency	Clare Embling (HWDT/University of Aberdeen)
Harbour porpoise	2009-2010	Scottish west coast (Hebrides)	Line transect visual and acoustic surveys	Distribution; density; sighting frequency	Cormac Booth (HWDT/SMRU)
Harbour porpoise	2009-2010	Scottish west coast (Hebrides)	Acoustic surveys	Measures of acoustic deterrent devices	Simon Northridge (HWDT/SMRU/SARF)
Harbour porpoise	2010-2011	Moray Firth	Assessment of potential use of digital aerial survey techniques for cetacean surveys	Distribution, relative density, surfacing patterns	Paul Thompson, AULFS
Harbour porpoise and bottlenose dolphin	2010-2011	Moray Firth	Comparison of visual and PAM techniques.	Distribution, relative density	P. Thompson, AULFS
Killer whale	2009	Scottish west coast (Hebrides)	Photo identification and sightings data	Site fidelity	Andy Foote/Philip Morin http://www.northatlantickillerwhales.com/
Killer Whale	2009	Scottish west coast (Hebrides)	Photo Identification and sightings data	Site fidelity	Andy Foote/Philip Morin/HWDT http://www.northatlantickillerwhales.com/
Killer whale	2010	Scottish west coast (Hebrides)	Photo Identification and sightings data	Distribution; sighting frequency	Harriet Bolt (HWDT/University of Aberdeen)
Minke whale	2008-present	Scottish west coast (Hebrides)	Photo identification, visual surveys, sightings data and static fishing gear data	Occurrence, causes and mitigation of entanglement	Simon Northridge (HWDT/SMRU)
Minke Whale	2008-present	Scottish west coast (Hebrides)	Photo Identification, visual surveys, sightings data and static fishing gear data	Occurrence, causes and mitigation of entanglement	Simon Northridge (HWDT/SMRU)
White-beaked dolphin/short-beaked common dolphin	2010	Scottish west coast (Hebrides)	Visual surveys	Distribution; density; sighting frequency	Caroline Weir (HWDT/Ketos Ecology)
Various small cetaceans	2010	West coast of Scotland	Occupancy-abundance relationships	Occupancy, abundance	C.D. MacLeod and G.J. Pierce/OCEANLAB
Various small cetaceans	2010-11	NE Atlantic	Predictive modelling of climate change effects on distribution based on habitat models	Various niche factors, notably temperature	E. Lambert, C.D. MacLeod and G.J. Pierce/OCEANLAB

CREEM were engaged in five projects of technique development during the two-year period covered by this report:

1. DECAF (Density Estimation of Cetaceans from passive Acoustic Fixed sensors) was a 3-year project that started in July 2007 and officially ended in February 2011 (after a no-cost 6-month extension). It developed and promoted the use of acoustics-based density estimation methods, and it considered case studies of Blainville's beaked whales and sperm whales in the Bahamas (AUTEK, US navy range), and minke whales in Hawaii (PMRF, US navy range). A considerable number of published outputs, including links to the pdfs, is available at <http://www.creem.st-and.ac.uk/decalf/outputs>.
2. LATTE (Linking Acoustic Tests and Tagging using statistical estimation: Modelling the behaviour of beaked whales in response to mid-frequency active sonar) is focused on beaked whales at a Navy Range in the Bahamas (AUTEK). This 3-year ongoing project started in 2010. The objectives are to integrate data at multiple scales (coarse: Navy range data; medium: satellite tag data; fine: DTag data level) to assess the impacts of active sonar in this species. It involves fitting movement models to the tag data in order to integrate this information with that collected in the hydrophones on the range
3. Methods to estimate whale abundance using widely spaced, or sparse, hydrophone arrays were developed and tested during a PhD project (Danielle Harris), which ran from 2007 to 2012 and was funded by the UK Defence Science and Technology Laboratory. Three case studies were worked on involving blue whale vocalisations recorded near Diego Garcia in the northern Indian Ocean, and both blue and fin whale vocalisations recorded in the northeast Atlantic Ocean.

4. "Cheap DECAF" (Density Estimation of Cetaceans from passive Acoustic Fixed sensors) is a two-year project that aims to continue the development of abundance estimation methods using acoustic data, focusing on sparsely distributed hydrophone arrays. Hydrophone arrays with larger spacing between instruments are advantageous because they present a more cost-effective means of data collection than "dense" hydrophone arrays; either a larger study area can be covered, or the same study area can be monitored using fewer hydrophones (hence the name "Cheap" DECAF). Data from fin whale vocalisations recorded in the northeast Atlantic Ocean are being used as the case study for the project.
5. The Joint Cetacean Protocol comprising sightings and effort data from designed surveys and platforms of opportunity conducted by organisations from many survey platforms (boats and aircraft) from the northwest Atlantic and the North Sea 1987–2010. The spatial distributions of several species and trends in abundance over time were estimated. Sightings were adjusted for imperfect detectability and surface availability to produce estimated response variates. These response variables were fitted using models with environmental predictors and spatial smoothers.

On behalf of the CCW, the publication “The Atlas of the Marine Mammals of Wales”, by M. E. Baines and P. G. E. Evans has been subject to international peer review and revisions have been made. It is to be published in 2012 as CCW Monitoring Report 68, 2nd edn. 138 pp. Further, the PhD study by Hanna Nuuttila (University of Bangor and St Andrews) will be reporting on the use of static acoustic monitoring (SAM) equipment as a tool to monitor changes in habitat use, distribution and abundance of a coastal population of bottlenose dolphins and harbour porpoises in Cardigan Bay. The study will define an optimal sampling regime for monitoring small areas and identify sites representative of the larger area of Cardigan Bay for sampling purposes.

The CWT has been investigating acoustic deterrent devices as means of reducing cetacean bycatch in inshore setnet fisheries.

3. MARKING DATA

3.1 Field work

3.1.1 Natural marking data

Species	Feature	Area/stock	No. photo-id'd	Catalogue (Y/N)	Catalogue total	Contact person/institute; refs
Bottlenose dolphin	Dorsal fin	West of Scotland	16	Y	16	Ben Wilson/SAMS
Bottlenose dolphin	Dorsal fin	Scottish west coast (Hebrides)	7	Y	39	Nienke van Geel/HWDT
Bottlenose dolphin	Dorsal fin	Scottish west coast (Hebrides)	7	Y	53	Olivia Harries /HWDT
Bottlenose dolphin	Dorsal fin	Scotland	81 (2010), 97 (2011)	Y	247 (2010), 261 (2011)	Kevin Robinson/CRRU
Bottlenose dolphin	Fin	NE Scotland		Y		Barbara Cheney, AULFS; Cheney et al. In
Common dolphin	Dorsal fin	Scotland		Y	78	Kevin Robinson/CRRU
Humpback whale	Tail fluke/ dorsal fin	Scotland		Y	3	Kevin Robinson/CRRU
Minke whale	All parts	Scottish west coast (Hebrides)	28	Y	125	Nienke van Geel/HWDT
Minke whale	All parts	Scottish west coast (Hebrides)	28	Y	125	Olivia Harries/HWDT
Minke whale	Dorsal fin	Scotland		Y	53 (2010), 54 (2011)	Kevin Robinson/CRRU
Risso's dolphin	Dorsal fin, flank markings	Bardsey Island, Pen Llyn a'r Sarnau		Y		Sonja Eisfeld/WDCS
Risso's dolphin	Dorsal fin, flank markings	Bardsey Island, Pen Llyn a'r Sarnau		Y		Sonja Eisfeld/WDCS
Risso's dolphin	Dorsal fin, flank markings	Isle of Lewis, Scotland	39	Y	39	Nicola Hodgins/WDCS
Risso's dolphin	Dorsal fin	Scottish west coast (Hebrides)	15	Y	30	Nienke van Geel/HWDT
Risso's dolphin	Dorsal fin	Scottish west coast (Hebrides)	15	Y	30	Olivia Harries/HWDT
Risso's dolphin	Dorsal fin	Scotland		Y	26	Kevin Robinson/CRRU

Short-beaked common dolphin	Dorsal fin	Scottish west coast (Hebrides)	13	N	0	Nienke van Geel/HWDT
Short-beaked common dolphin	Dorsal fin	Scottish west coast (Hebrides)	13	N	0	Olivia Harries/HWDT
White-beaked dolphin	Dorsal fin	Scottish west coast (Hebrides)	60	N	0	Nienke van Geel/HWDT
White-beaked dolphin	Dorsal fin	Scottish west coast (Hebrides)	60	N	0	Olivia Harries/HWDT

WDCS continues to conduct photo-ID of Risso's dolphins around Bardsey Island and the Llyn Peninsula in northwest Wales. WDCS collaborates with CCW, SWF and the Manx Whale and Dolphin Watch (MWDW) to cross-reference sightings data. The catalogue of photo-ID confirms that individuals may range between Pembrokeshire, the Bardsey Island area, Anglesey and the Isle of Man, and will return to the same locations from one year to the next.

WDCS also initiated the creation of a photo-id catalogue for Risso's dolphins off the Isle of Lewis in the Western Isles during August and September 2010. Additional research was undertaken in 2011 and is currently being analysed. WDCS is also collaborating with the HWDT to cross-reference photo-ID data.

CCW continues to investigate the connectivity of bottlenose dolphins in Welsh waters. A bottlenose dolphin photo-ID study continues in collaboration with the SWF. A significant proportion of the Cardigan Bay population uses these waters during autumn and winter, and their use of the area extends to the Dee Estuary and Isle of Man.

CRRU continues to conduct photo-ID of bottlenose dolphins and minke whales in the southern Moray Firth, Scotland, but also further references any other cetacean species in this region. Further to earlier comparisons of photo-ID of minke whales in Scotland with the HWDT, CRRU also examined records from the SWF, Scotland, and Faxafloi Cetacean Research, Iceland, in 2010 and 2011. CRRU is also currently carrying out studies with Indo-Pacific humpbacked dolphins and Irrawaddy dolphins in Trang Province, southwest Thailand.

3.1.2. Artificial marking data

None

3.1.3 Telemetry data

Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute; refs
Minke whale	TDR	0	0	K. Robinson/CRRU

CRRU continued its work with TDR suction tags in the Moray Firth. However, no successful deployments were achieved in 2010 or 2011.

3.2 Analyses/development of techniques

Target species	Date	Area	Methods/effort	Parameters/ factors measured	Contact person/institute; refs
Bottlenose dolphin	2010-2011	Moray Firth, Scotland	Developed spatially-explicit mark-recapture models to infer the exposure rate of individual dolphins to disturbances	Photo-id	AUCAStOR David Lusseau (Lusseau <i>et al.</i> 2012)

The HWDT use natural marking data – estimates of population size, movement patterns, especially focusing on bottlenose dolphin, killer whale, minke whale, white-beaked dolphin and Risso's dolphin.

SMRU (Simon Northridge) and HWDT (Nienke van Geel and Olivia Harries) are using the HWDT photo-id catalogue to explore possible fishery interactions with minke whales.

AULFS (Barbara Cheney) is developing a laser-metric system for measuring individual body size during photo-ID surveys.

SWF is working with the University of Bangor's SEACAMS Project to develop a hand-held device with software application for easy logging and retrieval of sightings and effort data for boat operators. This is being tested out first with a sample of wildlife trip operators in Wales.

4. TISSUE/BIOLOGICAL SAMPLES COLLECTED

4.1 Biopsy samples (summary only)

Species	Area/stock	Calendar year/ season - no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
None						

4.2 Samples from directed catches (commercial, aboriginal and scientific permits) or bycatches

Species	Area/stock	Tissue type(s)	No. collected	Archived (Y/N)	No. analysed	Contact person/institute
Harbour porpoise	Celtic Sea	Teeth, skin	5 (2010) 11(2011)	Y	0	Simon Northridge/SMRU
Short-beaked common dolphin	Celtic Sea	Teeth, Skin	1 (2010) 8 (2011)	Y	0	Simon Northridge/SMRU

4.3 Samples from stranded animals

Species	Area/stock	Tissue type(s)	No. collected	Archived (Y/N)	No. analysed	Contact person/institute
Atlantic white-sided dolphin	See footnote	Skull	25	Y	Archived	Zena Floody/NMS
Atlantic white-sided dolphin	See footnote	Skeletal specimen	26	Y	Archived	Zena Floody/NMS
Atlantic white-sided dolphin in 2010	UK	Various	2	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Atlantic white-sided dolphin in 2011	UK	Various	5	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Bottlenose dolphin	See footnote	Skull	7	Y	Archived	Zena Floody/NMS
Bottlenose dolphin	See footnote	Skeletal specimen	4	Y	Archived	Zena Floody/NMS
Bottlenose dolphin	See footnote	Teeth	1	Y	Archived	Zena Floody/NMS
Bottlenose dolphin in 2010	UK	Various	3	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Bottlenose dolphin in 2011	UK	Various	5	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Cuvier's beaked whale	See footnote	Skull	2	Y	Archived	Zena Floody/NMS
Cuvier's beaked whale	See footnote	Skeletal specimen	3	Y	Archived	Zena Floody/NMS
Fin whale in 2011	UK	Various	2	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC
Fraser's dolphin	See footnote	Skeletal specimen	1	Y	Archived	Zena Floody/NMS
Harbour porpoise	See footnote	Skull	128	Y	Archived	Zena Floody/NMS
Harbour porpoise	See footnote	Skeletal specimen	31	Y	Archived	Zena Floody/NMS
Harbour porpoise	See footnote	Scapula	1	Y	Archived	Zena Floody/NMS
Harbour porpoise	Hebrides (stranded)	Skin	1	Y	N/A	Olivia Harries/HWDT; Bob Reid and Andrew Brownlow/SAC
Harbour porpoise in 2010	UK	Various	68	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Harbour porpoise in 2011	UK	Various	74	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Killer whale	See footnote	Skeletal specimen	1	Y	Archived	Zena Floody/NMS
Killer whale in 2011	UK	Various	1	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Lesser rorqual	See footnote	Skeletal specimen	6	Y	Archived	Zena Floody/NMS

Minke whale	See footnote	Skull	2	Y	Archived	Zena Floody/NMS
Minke whale in 2010	UK	Various	5	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Northern bottlenose whale	See footnote	Skeletal specimen	2	Y	Archived	Zena Floody/NMS
Long-finned pilot whale	See footnote	Skull	9	Y	Archived	Zena Floody/NMS
Long-finned pilot whale	See footnote	Skeletal specimen	7	Y	Archived	Zena Floody/NMS
Long-finned pilot whale in 2010	UK	Various	1	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Long-finned pilot whale in 2011	UK	Various	18	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Minke whale in 2011	UK	Various	3	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC
Pygmy sperm whale	See footnote	Skeletal specimen	1	Y	Archived	Zena Floody/NMS
Pygmy sperm whale in 2011	UK	Various	1	Y	N/A	Andrew Brownlow & Bob Reid/SAC
Risso's dolphin	See footnote	Skull	8	Y	Archived	Zena Floody/NMS
Risso's dolphin	See footnote	Skeletal specimen	10	Y	Archived	Zena Floody/NMS
Risso's dolphin	Hebrides (floating and later stranded)	Blubber	2 (1 at sea and 1 on land)	Y	N/A	Olivia Harries/HWDT; Bob Reid and Andrew Brownlow/SAC
Risso's dolphin in 2010	UK	Various	5	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Sei whale in 2011	UK	Various	1	Y	N/A	Rob Deaville/IoZ
Short-beaked common dolphin	Hebrides (stranded)	Whole specimen sent to SAC	1	Y	1	Nienke van Geel/HWDT; Bob Reid/SAC
Short-beaked common dolphin	See footnote	Skull	17	Y	Archived	Zena Floody/NMS
Short-beaked common dolphin	See footnote	Skeletal specimen	28	Y	Archived	Zena Floody/NMS
Short-beaked common dolphin in 2010	UK	Various	9	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Short-beaked common dolphin in 2011	UK	Various	31	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC; Rod Penrose/MEM
Sowerby's beaked whale	See footnote	Skull	6	Y	Archived	Zena Floody/NMS
Sowerby's beaked whale	See footnote	Skeletal specimen	1	Y	Archived	Zena Floody/NMS
Sowerby's beaked whale in 2010	UK	Various	1	Y	N/A	Rob Deaville/IoZ
Sowerby's beaked whale in 2011	UK	Various	1	Y	N/A	Rob Deaville/IoZ
Sperm whale	See footnote	Skeletal specimen	1	Y	Archived	Zena Floody/NMS
Sperm whale	Hebrides (stranded)	Skin/blubber	1	Y	N/A	Nienke van Geel/HWDT; Bob Reid/SAC
Sperm whale in 2010	UK	Various	1	Y	N/A	Rob Deaville/IoZ
Sperm whale in 2011	UK	Various	3	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC
Striped dolphin	See footnote	Skull	11	Y	Archived	Zena Floody/NMS
Striped dolphin	See footnote	Skeletal specimen	11	Y	Archived	Zena Floody/NMS
Striped dolphin in 2010	UK	Various	3	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC
Striped dolphin in 2011	UK	Various	9	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC
White-beaked dolphin	See footnote	Mandible	2	Y	Archived	Zena Floody/NMS

White-beaked dolphin	See footnote	Skull	16	Y	Archived	Zena Floody/NMS
White-beaked dolphin	See footnote	Skeletal specimen	9	Y	Archived	Zena Floody/NMS
White-beaked dolphin in 2010	UK	Various	4	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC
White beaked dolphin in 2011	UK	Various	5	Y	N/A	Rob Deaville/IoZ; Andrew Brownlow & Bob Reid/SAC

The large amount of skeletal material listed in the table as archived by the NMS is derived from a variety of sources/stocks, though all were UK-sourced, and information on area/stock is available from the contact person listed.

N.B. At the time of report preparation, some of the individuals marked “in 2011” were frozen pending investigation at necropsy. Finalized data, including final causes of death, will be provided in the CSIP 2011 annual report to Defra and the devolved administrations in the UK, which will be published at

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17835&FromSearch=Y&Publisher=1&SearchText=strandings&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

4.4 Analyses/development of techniques

SAMS refined line-transect techniques for surveying harbour porpoises in tidal-stream waters moving near vessel speed. The results will be in a forthcoming Scottish Government report and presented at the 2012 ECS conference.

HWDT took a short-beaked common dolphin to SAC for a post mortem.

5. POLLUTION STUDIES

Cefas is continuing its studies of contaminants in tissues of marine mammals collected within the UK Cetacean Strandings Investigation Programme. In 2009 the main focus was on chlorobiphenyls (PCBs) and the brominated diphenyl ethers (PBDE brominated flame retardants, BFRs). Long-term trends (~15 years) are now available for brominated diphenyl ethers and another BFR compound hexabromocyclododecane in the blubber of harbour porpoises (both now declining) and for chlorobiphenyls in the same species and tissue (concentrations have now plateaued after earlier declines following the bans on use of PCBs which began in 1981). The concentrations of chlorobiphenyls are still at toxicologically significant levels in those animals.

More recently, Cefas has projects running to:

- study chlorobiphenyl concentrations in bottlenose dolphins and killer whales from European waters, because they are likely to be more highly contaminated than porpoises;
- determine concentrations of “novel” BFRs – the compounds that are replacing PBDEs – in porpoise blubber;
- study long-term temporal trends of organochlorine pesticides and trace elements in porpoise blubber as above for the other organohalogen compounds;
- lengthen the temporal trend series for chlorobiphenyls from 2006 to 2010.

During 2010, Defra funded the analysis of retrospective samples from 100 harbour porpoises (2004–2008) for chlorinated biphenyls (PCBs), organochlorine pesticides (OCs) and brominated diphenyl ethers (flame retardants, PBDEs). Analyses are ongoing at Cefas (<http://www.cefas.co.uk/>) and results are expected to be available in due course, progressing work towards a 20-year time-series of marine contaminant analysis in UK-stranded harbour porpoises.

In 2010, analyses of long-term temporal trends in blubber concentrations of PCBs ($n = 440$; 1991–2005) and PBDEs ($n = 415$; 1992–2008) in UK-stranded harbour porpoises were published. A non-parametric statistical method was used and potential confounding factors (area, season, by-caught or stranded, age class, sex, blubber thickness and lipid content) were investigated and found not to confound any of the trends identified. Summed PCB concentrations in UK harbour porpoises are declining only slowly from 1991–1997 and then levelled off up to 2005 as a result of a ban on the use of PCBs which began more than two decades ago. This decline is much slower than that observed for organochlorine pesticides (such as DDTs and dieldrin). There are also regional differences in PCBs and OC pesticide levels within UK waters (lower levels in Scotland), possibly reflecting differences in diffuse inputs and transfer between regions, e.g. via the atmosphere. The reason for the slow PCB decline is not known but likely to involve continuing diffuse inputs from, e.g., PCB-containing materials in storage, construction and in landfills, and to the substantial reservoir of PCBs already in the marine environment. Further efforts to limit or eliminate PCB discharges to the marine environment are needed.

PCB exposure data has also been generated for UK-stranded bottlenose dolphins ($n = 15$) and killer whales ($n = 5$) for the same period (1991–2005). The mean level for PCBs in UK-stranded bottlenose dolphins was almost 100 000 ng/g lipid weight and 225 000 ng/g lipid weight for killer whales. Although these data are from stranded animals, they show that PCB exposures are similar or greater than levels in biopsied bottlenose dolphins in the SW Atlantic such as Indian River Lagoon (Florida, US), Sarasota Bay (Florida, US) and Charleston (North Carolina, US). PCB blubber levels in UK-stranded killer whales are also similar to the very highest PCB levels recorded in adult transient male killer whales blubber in British Columbia, Canada. Given the concerns about high PCB levels, ASCOBANS funded IoZ to co-ordinate a project to assess PCB exposure in stranded bottlenose dolphins in European waters (Project ref: SSFA/ASCOBANS/2010/3). The final report to the ASCOBANS Secretariat on this project is due in July 2012.

During 2011, Defra funded the analysis of 100 retrospective samples from UK-stranded harbour porpoises (2004–2008) for polychlorinated biphenyls (PCBs) at Cefas. Combining these new data with older data from 1990 to 2008 has enabled a near 20-year time-series of data to be compiled for PCBs ($n = 540$), OC pesticides ($n = 489$) and brominated diphenyl ethers (BDEs) ($n = 415$) in UK-stranded harbour porpoises. Initial results show that concentrations of organochlorine pesticides, HBCD and BDEs are declining. In contrast, PCB concentrations have reached a plateau since 1997 following earlier reductions due to regulation of commercial use. Further reductions in PCB levels in UK waters are likely to take decades. Blubber PCB concentrations are still at toxicologically significant levels in many stranded harbour porpoises and at even higher levels in UK-stranded bottlenose dolphins and killer whales, mainly due to their higher trophic level in marine food chains in these top predator species. Further reductions in PCB inputs into the marine environment are undoubtedly needed to mitigate risk from PCB exposure in these species.

Given the concerns about high PCB levels, ASCOBANS funded IoZ to coordinate a project to assess PCB exposure in stranded bottlenose dolphins in European waters (Project ref: [SSFA/ASCOBANS/2010/3](#)). Blubber samples from stranded bottlenose dolphins from UK, Spain and Portugal are currently being analysed for organochlorine contaminants (PCBs). Data will be analysed and reported to the ASCOBANS Secretariat later in 2012.

6. STATISTICS FOR LARGE CETACEANS

6.1 Corrections to earlier years' statistics for large whales

None

6.2 Direct catches of large whales (commercial, aboriginal and scientific permits)

Species	Type of catch	Area/stock	Males	Females	Total landed	Struck and lost
None						

6.3 Anthropogenic mortality of large whales for the calendar years 2010 and 2011

6.3.1 Observed or reported ship strikes of large whales (including non-fatal events)

Whale species	Sex	No.	Date	Location	Vessel type	Speed	Fate	How observed	Contact person/ institute and refs
None									

6.3.2 Fishery bycatch of large whales

Whale species	Sex	No.	Date	Location	Fate	Targeted fish species	Gear	How observed	Source or contact
Minke whale ¹	M	1	10/06/10	Tighnabruaich, Argyll and Bute, Scotland	D	U	U	Stranded, diagnosed at necropsy	Bob Reid & Andrew Brownlow /SAC
Humpback whale	U	1	16/11/11	Dunbar, Scotland	R	U	Pot ropes	Entangled and released by BDMLR	Rob Deaville/ IOZ

Humpback whale	U	2	28/03/12 20/05/12	Loch Fine, Scotland Orkney, Shetland, Scotland	R	U	Creel lines	Entangled and released by members of the public	Rob Deaville/ IOZ
¹ Entanglement case. Found live stranded with chronic head and mandible injuries resulting from assumed rope entanglement and subsequent osteomyelitis									

7. STATISTICS FOR SMALL CETACEANS

7.1 Corrections to earlier years' statistics for small cetaceans

None

7.2 Direct catches of small cetaceans for the calendar years 2010 and 2011

Species	Type of catch	Area/stock	Males	Females	Total landed	Struck and lost
None						

7.3 Anthropogenic mortality of small cetaceans for the calendar years 2010 and 2011

7.3.1 Observed or reported ship strikes of small cetaceans (including non fatal events)

Species	Sex	No.	Date	Location	Vessel type	Speed	Fate	How observed	Contact person/ institute and refs
Harbour porpoise	1 M 1 F	2	04/2/11 11/10/11	Essex, England Pembrokeshire, Wales	U	U	U	M-stranded, diagnosed at necropsy	Rob Deaville/IOZ
Short-beaked common dolphin	1 M 1 F	2	31/3/11 23/5/11	Devon, England (both)	U	U	U	M-stranded, diagnosed at necropsy	Rob Deaville/IOZ

7.3.2 Fishery bycatch of small cetaceans

Species	Ratio of male to female (if known)	No.	No. extrapolated to fleet total (point estimate)	Range, CI or CV	Date of bycatch	Location (description or lat/long)	FAO statistical area (if known)	FAO area	Fate	Targeted species	Gear	How observed	Source or contact
Harbour porpoise	1:5	13	U	U	U	Stranded- various England, Scotland and Wales	U	U	D	U	U	M- stranded, diagnosed at necropsy	Rob Deaville/ IoZ; Andrew Brownlow & Bob Reid/SAC
Harbour porpoise	4:3	7	U	U	U	Stranded- various England, Scotland and Wales	U	U	D	U	U	M- stranded, diagnosed at necropsy	Rob Deaville/ (IoZ); Andrew Brownlow & Bob Reid (SAC)
Harbour porpoise	Unk	7	536	0.13	2010	Western Channel and Celtic Sea	27.VIIdefghj	27	D	Groundfish	GNS	M	Simon Northridge/SM RU
Harbour porpoise	Unk	1	unknown	n.a.	2010	North Sea	27.IVabc	27	D	Groundfish	GNS	M	Simon Northridge/SM RU
Harbour porpoise	Unk	26	836	0.09	2011	Western Channel and Celtic Sea	27.VIIdefghj	27	D	Groundfish	GNS	M	Simon Northridge/SM RU
Harbour porpoise	Unk	1	unknown	n.a.	2011	North Sea	27.IVabc	27	D	Groundfish	GNS	M	Simon Northridge/SM RU
Harbour porpoise	Unk	1	unknown	n.a.	2011	North Sea	27.IVabc	27	D	Salmon	GND	M	Simon Northridge/SM RU
Risso's dolphin	F	1	U	U	U	Stranded- Wales	U	U	D	U	U	M- stranded, diagnosed at necropsy	Rob Deaville/IoZ
Short-beaked common dolphin	4:3	7	U	U	U	Stranded- various England	U	U	D	U	U	M- stranded, diagnosed at necropsy	Rob Deaville/IoZ
Short-beaked common dolphin	1:2	3	U	U	U	Stranded- various England	U	U	D	U	U	M- stranded, diagnosed at necropsy	Rob Deaville/IoZ
Short-beaked common dolphin	~60:40	26	26 (census)	na	2010	Western Channel	27.VIIe	27	D	Sea bass	PTM	M	Simon Northridge/SM RU
Short-beaked common dolphin	Unk	3	287	0.17	2010	Western Channel and Celtic Sea	27.VIIdefghj	27	D	Groundfish	GNS	M	Simon Northridge/SM RU
Short-beaked common dolphin	~60:40	17	17 (census)	na	2011	Western Channel	27.VIIe	27	D	Seabass	PTM	M	Simon Northridge/SM RU
Short-beaked common dolphin	Unk	3	327	0.15	2011	Western Channel and Celtic Sea	27.VIIdefghj	27	D	Groundfish	GNS	M	Simon Northridge/SM RU
White-beaked dolphin	M	1	U	U	U	Stranded- England	U	U	D	U	U	M- stranded, diagnosed at necropsy	Rob Deaville/IoZ

8. STRANDINGS

The UK Cetacean Strandings Investigation Programme (CSIP) is a consortium of organisations consisting of IoZ, SACVSD, NHM and MEM. It is contracted by Defra and the Devolved Administrations in Scotland and Wales, to record information on all UK-stranded cetaceans and to conduct standardised necropsies on ~100 cetacean strandings per year, to allow the investigation of diseases and causes of death. Data collected by the CSIP are now held on a web-accessed database and extracts from this will be periodically exported to the National Biodiversity Network Gateway (<http://data.nbn.org.uk/>), to facilitate wider access to information on UK strandings. IoZ and SAC also maintain extensive tissue archives derived from UK stranded animals which have been necropsied. Further information on the CSIP can be found at www.ukstrandings.org.

In addition to the strandings coordination funded by Defra, the National Assembly for Wales is funding the Welsh Strandings Co-ordinator, Rod Penrose (MEM), in conjunction with the Countryside Council for Wales (CCW). The cetacean most commonly found stranded on the Welsh coast is the harbour porpoise, and the most common cause of death is from attack by bottlenose dolphins. The Scottish Strandings coordinator role is funded directly by the Scottish Government which also provides funding for a number of additional necropsies in Scotland. The Cornwall Wildlife Trust Marine Strandings Network (<http://www.cwtstrandings.org/index.html>) maintains its own strandings database, with all information feeding into the national UK CSIP database.

HWDT has a sightings/strandings network which encourages members of the public to report their sightings and strandings for the west coast of Scotland (Hebrides). Local strandings are attended if possible. Data are passed to the Strandings Coordinators for Scotland, Bob Reid and Andrew Brownlow, at the SAC in Inverness. Strandings reported to HWDT from elsewhere are reported directly to the SAC. Additionally, strandings and floating animals are also observed during the monitoring surveys. Data below are for the strandings HWDT were notified about and/or involved in.

Species	No. strandings	No. post mortems	Contact person(s)/ Institute(s)	Contact email address(es)
Atlantic white-sided dolphin in 2010	5	2	Andrew Brownlow (hereafter, AB)/Bob Reid (hereafter, BR) (SAC)	IoZ/SAC/ NHM/MEM
Atlantic white-sided dolphin in 2011	14	5	AB/BR (SAC), Rob Deaville (IoZ), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Bottlenose dolphin	1	0	Nienke van Geel (HWDT) Nienke van Geel (SAMS) Bob Reid (SAC)	biodiversityofficer@hwdt.org, OR Bob.Reid@sac.co.uk
Bottlenose dolphin in 2010	6	3	Rob Deaville (IoZ), AB/BR (SAC), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Bottlenose dolphin in 2011	14	5	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Cetacean in 2010 (indeterminate species)	39	0	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)/ Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Cetacean in 2011 (indeterminate species)	61	0	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Cuvier's beaked whale	1	0	Olivia Harries (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Cuvier's beaked whale in 2011	2	0	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Dwarf sperm whale in 2011	1	0	Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Fin whale in 2010	1	0	Rob Deaville (IoZ)/ Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Fin whale in 2011	3	2	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Harbour porpoise	1	0	Olivia Harries (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Harbour porpoise in 2010	260	68	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)/ Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Harbour porpoise in 2011	321	74	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Humpback whale in 2010	1	0	Rob Deaville (IoZ)/ Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Killer whale	1	0	Olivia Harries (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Killer whale in 2011	1	1	AB/BR (SAC)	IoZ/SAC/ NHM/MEM
Long-finned pilot whale in 2010	3	1	AB/BR (SAC)	IoZ/SAC/ NHM/MEM
Long-finned pilot whale in 2011	48	18	AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Minke whale in 2010	16	5	Rob Deaville (IoZ), AB/BR (SAC), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Minke whale in 2011	14	2	AB/BR (SAC), Rob Deaville (IoZ), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Northern bottlenose whale in 2011	1	0	AB/BR (SAC)	IoZ/SAC/ NHM/MEM
Pilot whale	1	0	Olivia Harries (HWDT) Bob Reid	biodiversityofficer@hwdt.org OR

			(SAC)	Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Pygmy sperm whale	1	1	Olivia Harries (HWDT) Nienke van Geel (SAMS) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Nienke.vanGeel@sams.ac.uk OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Pygmy sperm whale in 2011	1	1	AB/BR (SAC)	IoZ/SAC/ NHM/MEM
Risso's dolphin	1	0	Olivia Harries (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Risso's dolphin in 2010	5	5	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)/ Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Risso's dolphin in 2011	9	0	AB/BR (SAC), Brian Smith (NHM), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Sei whale in 2011	1	1	Rob Deaville (IoZ), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Short-beaked common dolphin	1	1	Nienke van Geel (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk
Short-beaked common dolphin	1	1	Olivia Harries (HWDT) Nienke van Geel (SAMS) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Nienke.vanGeel@sams.ac.uk OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
Short-beaked common dolphin/Striped dolphin (too decomposed for positive ID)	1	0	Nienke van Geel (HWDT) Nienke van Geel (SAMS) Bob Reid (SAC)	biodiversityofficer@hwdt.org, OR Bob.Reid@sac.co.uk
Short-beaked common dolphin in 2010	36	9	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)/ Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Short-beaked common dolphin in 2011	89	31	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Sowerby's beaked whale in 2010	2	1	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Sowerby's beaked whale in 2011	3	1	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM), Rod Penrose (MEM)	IoZ/SAC/ NHM/MEM
Sperm whale	1	0	Nienke van Geel (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk
Sperm whale in 2010	5	1	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Sperm whale in 2011	9	3	AB/BR (SAC), Rob Deaville (IoZ), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Striped dolphin in 2010	7	3	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM- see contact list
Striped dolphin in 2011	14	9	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
Striped or short-beaked common dolphin	1	0	Olivia Harries (HWDT) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
White-beaked dolphin	1	0	Olivia Harries (HWDT) Nienke van Geel (SAMS) Bob Reid (SAC)	biodiversityofficer@hwdt.org OR Nienke.vanGeel@sams.ac.uk OR Bob.Reid@sac.co.uk OR andrew.brownlow@sac.co.uk
White-beaked dolphin in 2010	14	4	Rob Deaville (IoZ), AB/BR (SAC), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM
White-beaked dolphin in 2011	10	5	AB/BR (SAC), Rob Deaville (IoZ), Brian Smith (NHM)	IoZ/SAC/ NHM/MEM

9. OTHER STUDIES AND ANALYSES

The HWDT Biodiversity Officer analysed data collected from a whale-watching platform over a 17-year period (1992–2009) to assess whether platforms of opportunity can contribute to conservation and management schemes. Harbour porpoise relative densities and distributions were investigated in the southern Inner Hebrides in respect to oceanographic and physiographic variables, and methods were employed to remove some of the inherent biases. Results showed that harbour porpoise are highly mobile throughout the area and that although opportunistic, this sequential, fine-scale, data provided a temporal insight into spatial distribution that studies conducted over broader geographic scales do not achieve. For more information, contact Olivia Harries at biodiversityofficer@hwdt.org.

Associated with activities of the CCW, a PhD study by Sarah Perry (University of Aberystwyth) is investigating the use of remote sensing data for modelling and monitoring the seasonal distribution and abundance of large marine fauna over whole sea areas. This will involve developing innovative techniques for identifying key localised areas used for breeding, feeding and migration, and will be achieved, in part, by considering the modelled and observed distributions of food chain species. The research is expected to provide dynamic datasets for whole sea areas essential for marine spatial planning purposes (e.g. informing sustainable fishing, marine renewable energy developments and management of the marine environment as a resource).

The CRRU (Kevin Robinson), working with AULFS, HWDT, the Marine Biodiversity Research Group, Ireland, IWDG etc, published the first study documenting the long distance movements by bottlenose dolphins between the UK and Ireland. The CRRU is also currently publishing the first ever account describing the dynamics of an agonistic attack on a bottlenose calf by an adult male. Further, the CRRU's Michael Tetley published a PhD thesis modelling the habitat preference and site fidelity of minke whales.

AULFS is carrying out studies on the potential impact of anthropogenic noise on harbour porpoises and bottlenose dolphin in the Moray Firth, and developing frameworks for assessing population level impacts of windfarm construction.

OCEANLAB was involved in the collection and analysis of survey abundance, diet and life history data from cetaceans in various parts of the world including Scotland (collaboration with SAC), NNW Spain, Bay of Biscay, Azores and West Africa.

SMRU, the HWDT and the SAC have compared a photo-id catalogue of minke whale scar patterns with photos from necropsied minke whales in Scotland. Somewhere between 5% and 20% of live animals in the photo catalogue show evidence of rope entanglement, and about 50% of stranded minke whales are diagnosed as having died from entanglement. When only the head region of animals that have been photo-identified is considered, 11 of 26 photographed individuals showed evidence of previous entanglement, suggesting that entanglement more be more frequent than the photo catalogue (which has primarily targeted dorsal fins and tails until recently) would initially suggest.

SMRU has trialled acoustic deterrent devices in the Cornish hake and tanglenet fisheries, and has shown an effective decrease in bycatch of porpoises when 'DDD' pingers are deployed at 4-km spacings. The fishing community is more willing to adopt these devices than others that are required every 100 or 200 m. Displacement trials using passive acoustic monitoring have suggested that these devices may deter porpoises and common dolphins to around 2 km.

Several other experiments and statistical analyses of observer data have been conducted to elucidate the mechanisms by which porpoises and dolphins may become caught in fishing gear.

The SMRU has also developed new means of tracking the vertical and three dimensional movements of porpoises using passive acoustic means.

Genetic studies using mtDNA and microsatellites of North Atlantic minke whales under the auspices of SWF indicate two sympatric, yet genetically distinct, populations. The implication is that minke whales range extensively across the North Atlantic seasonally, but segregate to some extent on at least two distinct breeding grounds.

Target species	Date	Area	Methods/effort	Parameters/ factors measured	Contact person/institute; refs
Minke whale	2010-2011	Iceland	Develop new analytical techniques to define activity of baleen whales and assess impact of whalewatching	Inter-breath interval and deviation index	AUCAStOR Fredrik Christiansen (Christiansen <i>et al.</i> 2011, submitted)
Minke whale	2011	Iceland	Determine the temporal dynamics of blubber deposition of minke whales on a foraging ground	Blubber thickness	AUCAStOR Fredrik Christiansen (Christiansen <i>et al.</i> submitted)
All	2010-2011	Worldwide	Develop modelling framework to assess the population consequences of behavioural disturbances	various	John Harwood CREEM / AUCAStOR David Lusseau (Lusseau <i>et al.</i> submitted)
Bottlenose dolphin	2010-2011	Moray Firth, Scotland	Develop analytical techniques to infer dolphin activity state from TPOD	Inter-click interval	AUCAStOR David Lusseau (Lusseau <i>et al.</i> 2012)

			data		
All	2011	Worldwide	Meta-analyse the effects of whalewatching exposure on cetacean behaviour	Activity state, respiration rate, deviation index	AUCASStOR / LaWE David Lusseau (Senigaglia <i>et al.</i> 2012)

10. LITERATURE CITED

Material that could have been listed here is instead listed under publications. Some are older than the target dates of 2010 or 2011, but are nevertheless listed for purposes of completeness.

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Appendix 1. FOA fishing descriptions and codes

FAO FISHING GEAR CATEGORIES:		FALLING GEAR	
SURROUNDING NETS		Cast nets	FCN
With purse lines	PS	Falling gear (not specified)	FG
One-boat operated purse seines	PS1	GILLNETS AND ENTANGLING GEAR	
Two-boat operated purse seines	PS2	Set gillnets (anchored)	GNS
Without purse lines (lampara)	LA	Driftnets	GND
SEINE NETS		Encircling gillnets	GNC
Beach seines	SB	Fixed gillnets (on stakes)	GNF
Boat seines	SV	Trammel nets	GTR
Danish seines	SDN	Combined gillnet-trammel nets	GTN
Scottish seines	SSC	Gillnets and entangling gillnets (not specified)	GEN
Pair seines	SPR	Gillnets (not specified)	GN
Seine nets (not specified)	SX	TRAPS	
TRAWLS		Stationary uncovered pounds nets	FPN
Bottom trawls	TBB	Pots	FPO
Beam trawl	OTB	Fyke nets	FYK
Otter trawls (side or stern)	PTB	Stow nets	FSN
Pair trawls	TBN	Barriers, fences, weirs, etc	FWR
Nephrops trawls	TBS	Aerial traps	FAR
Shrimp trawls (not specified)	TM	Traps (not specified)	FIX
Midwater trawls		HOOKS AND LINES	
Otter trawls (side or stern)	OTM	Handlines and pole-lines (hand operated)	LHP
Pair trawls	PTM	Handlines and pole-lines (mechanised)	LHM
Shrimp trawls	TMS	Set longlines	LLS
Midwater trawls (not specified)	TM	Drifting longlines	LLD
Otter twin trawls	OTT	Longlines (not specified)	LL
Otter trawls (not specified)	OT	Trolling lines	LTL
Pair trawls (not specified)	PT	Hooks and lines (not specified)	LX
Other trawls (not specified)	TX	GRAPPLING AND WOUNDING	
DREDGES		Harpoons	HAR
Boat dredges	DRB	HARVESTING MACHINES	
Hand dredges	DRH	Pumps	HMP
LIFT NETS		Mechanised dredges	HMD
Portable lift nets	LPN	Harvesting machines (not specified)	HMX
Boat-operated lift nets	LNB	MISCELLANEOUS GEAR	MIS
Shore operated stationary lift nets	LNS	RECREATIONAL FISHING GEAR	RG
Lift nets (not specified)	LN	GEAR NOT KNOWN OR NOT SPECIFIED	NK
		SHARK CONTROL NETS	NSC
		DERELICT FISHING GEAR	