

Agenda Item 4.3.1

Review of New Information on other Matters
Relevant for Small Cetacean Conservation

New Agreement Area

Report and Recommendations of the
Extension Area Working Group

Document 4.3.1

**Intersessional Working Group on
Research and Conservation Actions
Undertaken in the Extended
Agreement Area: Update for the
Period March 2012 to August 2013**

Action Requested

- Take note
- Comment

Submitted by

Extension Area Working Groups



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

**INTERSESSIONAL WORKING GROUP ON RESEARCH AND CONSERVATION ACTIONS
UNDERTAKEN IN THE EXTENDED AGREEMENT AREA:
UPDATE FOR THE PERIOD MARCH 2012 TO AUGUST 2013**

Compiled by Peter G.H. Evans (WG Chair)

Introduction

This aim of this group is to review the current research and conservation efforts by Contracting Parties, Range states and others within the ASCOBANS Extension Area (Fig. 1), and to identify what opportunities for collaboration exist. A summary of recent research and conservation actions undertaken by country was presented in March 2012 at AC19 in Galway, Ireland. The present report updates that, covering the last 18 months.

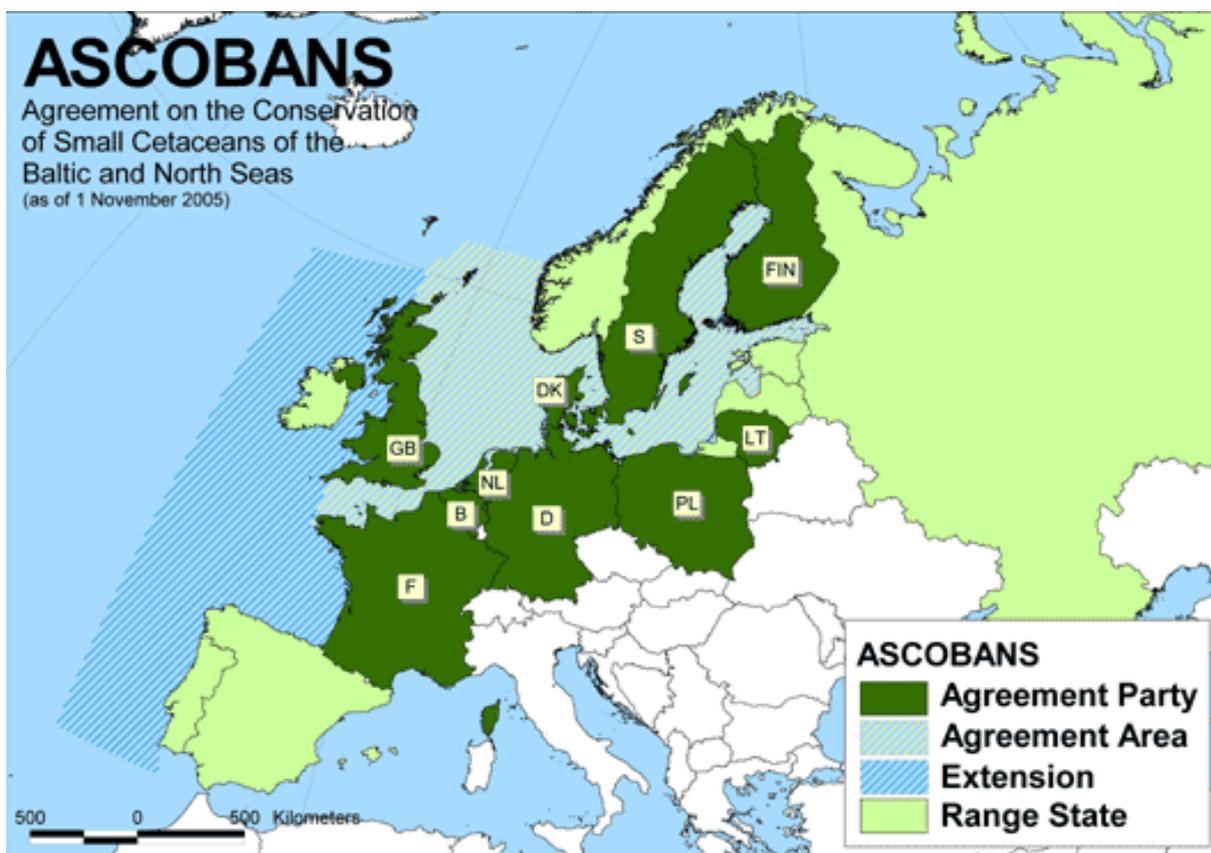


Fig. 1: Map of ASCOBANS Agreement Area showing Extension area covered by this Working Group

Terms of Reference

Intersessional Working group on research and conservation actions undertaken in the extended Agreement Area

1. Reporting will concentrate upon giving summary information on progress in the extension area to-date, identifying common themes and any region specific issues (e.g. particular fisheries, new pressures identified, local species abundance or trends).

2. To make recommendations to Contracting Parties on how the Agreement could address such issues.
3. To promote collaboration with ACCOBAMS and those non-Party Range States within the extended Agreement area.
4. The group will report back to the ASCOBANS MoP7

Membership

UK, France, ACCOBAMS (open to any Contracting party/observer to ASCOBANS, IGO's) as well as any Government or NGO representative of non-Party Range States (Ireland, Spain and Portugal).

Summary of Recent Research & Conservation Actions in the Extension Area

a) United Kingdom

Visual and acoustic vessel surveys continue to be conducted during summer months in West Scotland throughout the Sea of Hebrides, extending into the Minches and to some extent west of the Outer Hebrides (Hebridean Whale & Dolphin Trust, HWDT). Visual ferry surveys have continued around the Small Isles (Rum, Eigg, Canna and Muck), with other vessel surveys further afield to the Outer Hebrides in conjunction with basking shark observations (Sea Watch Foundation, SWF). Whale & Dolphin Conservation (WDC) has continued surveys targeting Risso's dolphin on the east coast of Lewis, Outer Hebrides. During summer 2012, minke whale numbers were significantly higher in the region than in preceding years, but during summer 2013, numbers at least in the Inner Hebrides has been much reduced again. Other species that were regularly seen included harbour porpoise, short-beaked common dolphin, white-beaked dolphin, and Risso's dolphin, with some sightings also of killer whale.

Images have been added to photo-ID catalogues for minke whale, killer whale, bottlenose dolphin and Risso's dolphin (HWDT, SWF & WDC, unpublished catalogues; Cheney *et al.*, 2013;). The populations of bottlenose dolphin and killer whale in West Scotland remain small. Interestingly, one distinctive male killer whale individual (nicknamed John Coe) that has been regularly observed off the west coast since the 1980s, was photographed for the first time in the North Sea off the Aberdeenshire coast, in August 2013, suggesting that the idea that there is a spatially distinct west coast community needs modification (although individuals attributed to this grouping are observed primarily in that region).

Further south around the Isle of Man, The Manx Whale & Dolphin Watch (MWDW) actively recorded sightings of cetaceans in their coastal waters, undertaking some opportunistic surveys mainly targeting Risso's dolphin photo-ID. Some bottlenose dolphins were also photographed in Manx waters, and have been matched with individuals photographed within Cardigan Bay and off the North Wales coast.

Photo-ID surveys of bottlenose and Risso's dolphin were undertaken in North Wales by the Sea Watch Foundation, as part of the Connectivity Project funded by Natural Resources Wales (previously called Countryside Council for Wales). Whale & Dolphin Conservation (WDC) continued its long-term photo-ID studies of Risso's dolphin around Bardsey Island

(Eisfeld & Lott, 2013). A collaborative effort by WDC, MWDW, and SWF contributes to an Irish Sea Risso's dolphin Photo-ID catalogue, resulting in confirmation that individuals may range between Pembrokeshire, Bardsey Island area, Anglesey and the Isle of Man, returning to the same locations from one year to the next.

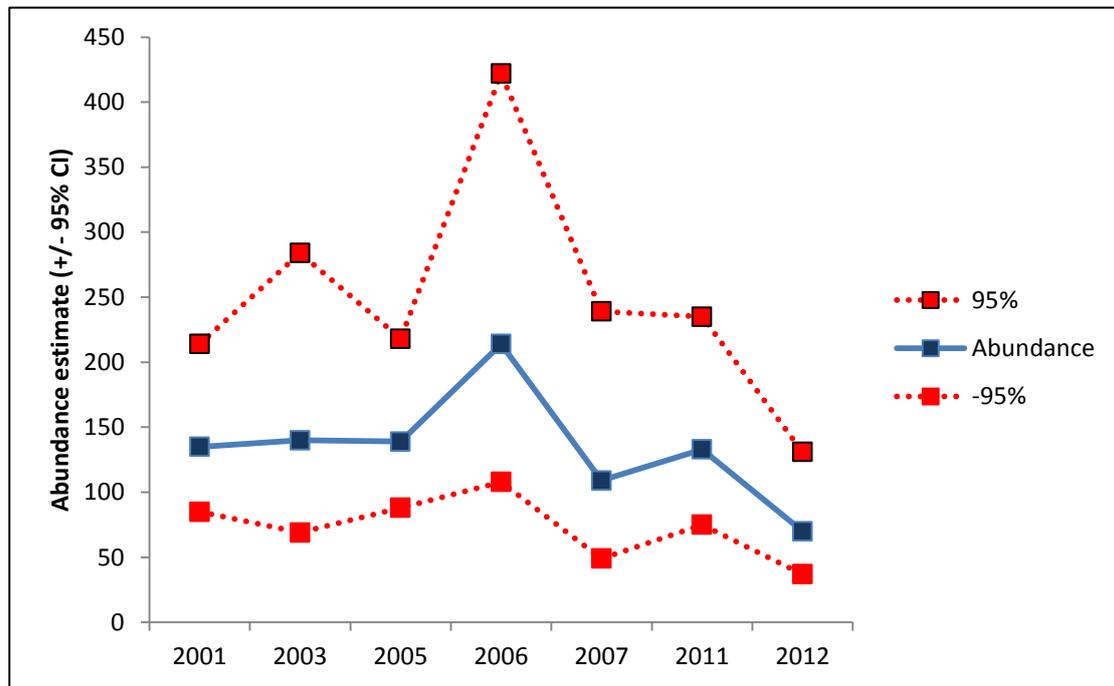


Fig. 2. Absolute Abundance estimates (& 95% confidence limits) from line-transect surveys in Cardigan Bay SAC (from Feingold & Evans, 2013)

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) (Veneruso & Evans, 2012; Feingold & Evans, 2012, 2013). In 2012, the overall Cardigan Bay abundance estimate for bottlenose dolphin was 330 (CV=0.24) and for harbour porpoise was 565 (CV=0.20), from line transect surveys. After earlier (2001-06) increases, abundance estimates of the bottlenose dolphin population of Cardigan Bay Special Area of Conservation show a general decline (Figure 2). Life history parameters measured from photo-ID for bottlenose dolphin indicate an annual birth rate for 2012 of between 4.1% and 7.1% (cf. 8.8-11.3% in 2011), depending upon whether a closed or open population model is adopted; an inter-calf interval ranging from 2-6 years, with 3 years being the most common; and calf mortality rates of 18% (year 1), 18% (year 2), and 8% (year 3) (Feingold & Evans, 2013). 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 (Veneruso & Evans, 2012; Feingold & Evans, 2012, 2013). In summer 2013, however, some Cardigan Bay individuals were photographed by SWF in Liverpool Bay, NW England. Acoustic studies using T-PODs and C-PODs have been undertaken between 2009-12, with experiments conducted to more closely examine how detection rates of PODs relate to actual numbers of animals for both bottlenose dolphin and harbour porpoise (Goulton, 2012; Nuuttila, 2013; Nuuttila *et al.*, 2013a, b).

Two studies were conducted on Cardigan Bay bottlenose dolphin whistle characteristics in relation to environmental parameters and geographic variation (between Wales, Ireland, France, and Portugal) in whistle characteristics, respectively, by Thompson (2012) and Bird (2012). In the former case, these showed a significant relationship between whistle frequency, increased boating activity, shallower water depths, and increased group cohesion; and in the latter case, regional variation in whistle frequency and intensity, being significantly higher in the Sado estuary (Portugal) population.

Visual sightings surveys in the Irish Sea have been undertaken by the Irish Whale & Dolphin Group (IWDG), Friends of Cardigan Bay, Sea Trust South & West Wales, and SWF, either using platforms of opportunity such as ferries, or small chartered vessels. Land based watches have been conducted around Irish Sea coasts, by various NGO groups (IWDG, MWDW, SWF, Cardigan Bay Marine Wildlife Centre, Ceredigion County Council, Marine Awareness North Wales, and Gower Marine Mammal Project).

In the Irish Sea, an atlas of marine mammal distribution was produced for Natural Resources Wales (Baines and Evans, 2012); harbour porpoise, bottlenose dolphin, short-beaked common dolphin, Risso's dolphin and minke whale were the five most frequently recorded species.

On a wider scale, the Joint Cetacean Protocol (JCP) aims to deliver information on the distribution, abundance and population trends of cetacean species occurring in NW European waters. It was intended that the project outputs would assist governmental reporting to various Directives (e.g. the Habitats Directive and the Marine Strategy Framework Directive) and would also improve the robustness of marine Environmental Impact Assessments. The JCP brings together effort-related cetacean sightings data from a variety of sources including large scale international surveys such as SCANS & SCANS-II and CODA, surveys based on platforms of opportunity such as ICES International Bottom Trawl Surveys (European Seabirds at Sea (ESAS) cetacean data), as well as non-governmental data (e.g. Sea Watch Foundation and Atlantic Research Coalition) and industry data (e.g. that collected in relation to potential renewable energy installations).

There have been three major phases of JCP analyses (<http://jncc.defra.gov.uk/page-5657>). The first phase concentrated upon the Irish Sea, and the second phase the entire west coast of UK. Phase III was completed in 2012, and models were developed to cover the NW European Atlantic area for seven species. The analysis produced species-specific density surfaces over the whole JCP area and more recent period of data collection. Following peer review, a revised version was submitted in July 2013 (Paxton *et al*, 2013). Updates will be posted on/through the Joint Cetacean Protocol webpage in due course.

Strandings schemes exist for all UK coastlines, with regional management by the Scottish Agricultural College Veterinary Services, Inverness (for Scotland), Marine Environmental Monitoring, Cardigan (for Wales), and Institute of Zoology, London (for England). The latest report, for the period 2005-10, was compiled on behalf of all three bodies, by Deaville and Jepson (2011). As before, harbour porpoise and common dolphin were the most commonly recorded stranded species. Most common identified causes of death were fisheries by-catch, bottlenose dolphin kills (for harbour porpoise, particularly in Wales), starvation

(mainly harbour porpoise), and infectious disease. An analysis of post-mortem examinations conducted between 1991 and 2010, showed a slight decline in the proportion of by-catch in UK stranded harbour porpoises and short beaked common dolphins, and a relative increase in the proportion of infectious disease and starvation in harbour porpoises.

During 2012, three publications arose from collaborative research between the CSIP and the Centre for Environment, Fisheries and Aquaculture Science (Cefas). The first incorporated polychlorinated biphenyl (PCB) data for 25 individual chlorobiphenyl congeners (sum25CBs) (n=540), several organochlorine pesticides (n=489) and nine brominated diphenyl ether congeners (BDEs) (n=415) in UK-stranded harbour porpoises stranded between 1990 and 2008 (Law *et al.*, 2012a). Results show that concentrations of organochlorine pesticides, HBCD and BDEs were declining consistently over time. In contrast, PCB (sum25CBs) concentrations reached a plateau in 1997-8, following earlier reductions due to regulation of commercial use, and have not declined in UK harbour porpoises since. Blubber PCB concentrations are still at toxicologically significant levels in many stranded harbour porpoises and occur at even higher levels in UK-stranded bottlenose dolphins (*Tursiops truncatus*) and killer whales (*Orcinus orca*) (Law *et al.*, 2012a), mainly due to the higher trophic level in marine food chains, size and longevity, of these top predator species. Further reductions in PCB levels in UK and European waters are likely to take many decades even if PCB levels do start to decline in future. Worryingly, there are few coastal groups of killer whales remaining in Europe outside of the Icelandic-Norwegian population, and those that do remain show very low reproductive rates.

The second study investigated butyltin concentrations (monobutyl, dibutyl and tributyltin (TBT)) in the liver of UK-stranded harbour porpoises (n=410) from 1992–2005, and again in 2009, following a ban on the use of tributyltin-based antifouling paints on ships (Law *et al.*, 2012b). The aim was to assess the effectiveness of the regulation, which was implemented during 2003–08 as large ships are repainted only every five years. Since the ban was implemented, summed butyltin concentrations have declined. The percentage of animals in which TBT was detected had also fallen sharply, indicating the cessation of fresh inputs into the marine environment. In 1992, 1993 and 1995, TBT was detected in 100% of samples analysed. In 2003–05, once the implementation of the ban had begun, this fell to 61–72%, and in 2009, following the completion of the ban, it had reduced to only 4.3% (i.e. in only one of 23 samples analysed). The study therefore concluded that the ban has proved effective in reducing TBT inputs to the seas from vessels.

The third study found statistical associations between polychlorinated biphenyls (PCBs) exposure and involution of lymphoid tissue and development of epithelial-lined cysts in the thymus of UK stranded harbour porpoises (n=170) (Yap *et al.*, 2012). The percentage of thymic lymphoid tissue (%TLT) was histologically quantified using standardised methodology. Multiple regression analyses (n=169) demonstrated a significant and positive correlation between %TLT and two quantitative indices of nutritional status (regression of body weight to body length and mean blubber thickness) and significant negative association between %TLT and onset of sexual maturity. However, in a subgroup of porpoises with total PCB levels (as Arochlor 1254) above a proposed threshold of toxicity (>17 mg/kg lipid weight) (n = 109), the negative association between %TLT (as dependent variable) and summed blubber concentrations of 25 chlorobiphenyl congeners (sum25CBs)

remained significant along with both indices of nutritional status and onset of sexual maturity. These results are highly consistent with PCB-induced immunosuppression in harbour porpoises in UK waters, but only at PCB concentrations that exceed proposed thresholds for toxicity in marine mammals. In contrast, development of thymic cysts appeared to be predominantly age-related change.

During 2012, Defra funded the analysis of 42 retrospective samples from UK-stranded harbour porpoises (2008-2010) for PCBs. In addition, Defra also agreed to fund further contaminant analyses under a variation to the current CSIP contract. The two small scale projects that were funded are titled “UK-stranded common dolphin contaminant analyses (supporting EU-funded Marie Curie Fellowship “CETACEAN STRESSORS”)” and “Risk assessment of polychlorinated biphenyl (PCB) exposure in marine top predators”. Delivery of final reports to Defra for both projects will occur in mid-2014.

In 2010, the Cornwall Wildlife Trust launched the Seaquest Netsafe Project to increase its understanding of key cetacean species around the coast of Cornwall and work to identify practical means of reducing cetacean by-catch within fisheries. To date, the pinger trial has shown a 48% reduction in harbour porpoise activity around nets equipped with pingers (as measured by C-PODs) with no evidence for habituation to the pingers. Very few practical issues associated with using the pingers were recorded, although some concerns were raised about the cost and life span of pingers.

A sensitivity analysis of impacts upon various cetacean species of different fishing activities in the Irish Sea, was conducted for NRW by Sea Watch Foundation (Evans & Baines, 2013).

A national dedicated by-catch monitoring scheme is operated by SMRU, while collaborative links with the three Fishery Research Laboratories in the UK also allow selected observations from the Discard Sampling Programmes to be included in our assessments of cetacean by-catch. The observer scheme relies upon good collaborative links with industry. Nevertheless fisheries regulations were enacted in England and Scotland to ensure that there is also a legal obligation for skippers and owners to take observers when asked to do so.

The principal area of concern for cetacean by-catch remains the southwestern waters of the Western Channel and Celtic Sea (the situation in the North Sea remains unclear as only limited monitoring has been done since the late 1990s). Monitoring is now being focused on these two areas, and as sufficient data are compiled, more robust estimates of current by-catch rates will become available.

The most recent two reports (2012 and 2011) can be found under the project code ‘MB5203’ at:

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18535&FromSearch=Y&Publisher=1&SearchText=cetacean%20by-catch&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>.

Monitoring of vessels using pingers (DDD-03L) is being continued under the heading of “scientific studies” as required by Regulation 812/2004, but at a relatively low level by comparison to preceding years. A total of 131 hauls with pingers were monitored in 2012. Dolphin and porpoise by-catches are being recorded using GPS positions, as are the

locations of DDDs being used on the same fleets, which will allow an assessment whether the efficacy of these devices changes over time. The UK's Marine Management Organisation (MMO) and the Marine Scotland Compliance and Enforcement Unit have pinger detection units that are being used to determine compliance at sea.

The most accurate by-catch estimates for 2012, taken from the Annex to the UK annual report to the Commission on the implementation of Regulation 812/2004 in 2012, were of 821 harbour porpoises (95% CI 510-1338) and 257 short-beaked common dolphins (95% CI 132-475) from static net fisheries in the Irish Sea, Western English Channel and Celtic Shelf (ICES divisions VIIaefghj). Caveats apply to these estimates. An estimated 492 seals, thought to be predominately grey seals (*Halichoerus grypus*: 95% CI 358-700), were also bycaught in this area.

The MMO is checking for compliance on the use of acoustic deterrent devices, including use of DDD-03Ls, in the over-12m static net fleet fishing in ICES Division VII as specified in Annex I of the Regulation. The MMO has liaised with industry regarding meeting their obligations under the Regulation. A similar device (DDD-03F) is being used on a voluntary basis on vessels participating in the small winter mid-water trawl fishery for bass (see UK Report under Regulation 812/2004).

b) France

Distribution

Visual surveys from aircrafts

In the Natura2000 framework, PACOMM (*Programme d'acquisition de connaissances sur les oiseaux et mammifères marins*) aims to describe the initial state of cetacean and seabird distribution and hotspots in the French EEZ and their seasonal variation, in order to support the management strategy of existing and proposed Natura 2000 sites and contribute to the design of new ones offshore.

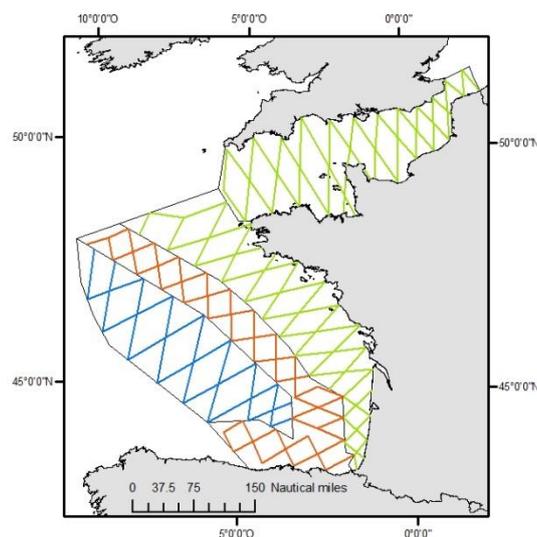


Fig. 3: Spatial range of the study area in the ASCOBANS area, with design effort into each stratum (shelf in green, slope in orange, oceanic in blue; the coastal stratum not shown extends from the coastline to 12 nm offshore)

The main cetacean project included in PACOMM was a series of aerial surveys initially planned to be conducted during two consecutive years in winter (November 2011 and 2012 to February 2012 and 2013) and in the summer (May to August 2012 and 2013). These aerial surveys, named SAMM (*Suivi Aérien de la Mégafaune Marine*), cover the entire French EEZ and some adjacent waters. The survey follows a line-transect methodology conducted at low altitude (600 feet) and constant speed (90 knots) along pre-determined linear transects designed in 4 bathymetric strata (coastal, shelf, slope, oceanic).

The first study year was completed from Nov 2011 to Feb 2012, and from May to August 2012 but, for budgetary reasons, the decision was taken not to undertake the second year of sampling. In the English Channel, harbour porpoise and common dolphin were the dominant species in the eastern Channel and in the western Channel respectively. In the Bay of Biscay, dominant species were the common dolphin, bottlenose dolphin and harbour porpoise. Harbour porpoises were found in a narrow coastal band from Brest to Biarritz, whereas common and bottlenose dolphins were more dispersed offshore, with higher densities at the shelf break. In the summer, the same species were predominant with some changes in distribution. Harbour porpoises were absent from the southern Bay of Biscay but widely distributed across the entire shelf of the northern Bay of Biscay and western Channel. Common dolphins were mostly found off the Atlantic coastline from the shelf to oceanic habitats, with higher encounter rates along the shelf break. Bottlenose dolphins were found scattered in shelf and inshore waters, and at higher encounter rates in oceanic and slope habitats.

Visual surveys from research and other vessels

Cetacean distributions were surveyed over the shelf of the Bay of Biscay (April-May, PELGAS and PELACUS surveys, and October-November, EVHOE survey) and English Channel (January, IBTS survey) by the University of La Rochelle (ULR) in order to determine relative abundance, preferential habitats and relationship with distribution of pelagic fish as determined by simultaneous acoustic survey carried out by the *Ifremer/ Instituto Español de Oceanografía* (IEO) research vessel *Thalassa* (Certain *et al.*, 2008, 2011). This survey followed a standardised protocol in use since 2003 in the Bay of Biscay (starting on the PELGAS surveys). Since 2007, ULR and IEO *Vigo* co-operated to collect data on cetacean distribution by using the same protocol in April in the south of the Bay of Biscay (PELACUS surveys). Finally, in 2010, ULR collected sightings from a benthic fish survey over the shelf of the Bay of Biscay in October and November (EVHOE surveys, *Ifremer*). Data on top predators from PELGAS, PELACUS, EVHOE and IBTS surveys are stored in a single database managed by ULR. During the nine PELGAS surveys conducted from 2003-11, 720 cetacean sightings of 11 cetacean species were collected from 18 000 nm of effort. The main features of cetacean distribution revealed high densities of common dolphins between the 30-100m isobaths in May, highest concentrations of bottlenose dolphins from the 150 metre isobath to the continental slope and a high diversity of delphinids, including long-finned pilot whales, along the shelf break. By comparison, the middle of the continental shelf exhibits low density of small cetaceans in May. Preliminary data collected in the autumn would suggest less contrasted distribution patterns for bottlenose and common dolphins.

A ferry from Roscoff (France) to Cork (Ireland) is used as a platform of opportunity to survey cetaceans across the Celtic Sea (Laboratory for the Study of Marine Mammals, Brest, LEMM-Oceanopolis).

Acoustic survey for harbour porpoise

Although the recent SCANS and SCANS-II surveys detected no or only a few harbour porpoises in French waters, about 150 have been found stranded yearly in recent time. To solve this apparent paradox, a large-scale passive acoustic survey is planned, to complement the visual surveys. As a preparatory step to this project still to be fully designed, a pilot study has been conducted in 2012 by deploying 15 C-PODs in order to test various issues regarding technical and logistical aspects.

Stranding and associated biological data

Stranding scheme

The French stranding network is nationally coordinated by ULR under an agreement with the Ministry of the Environment. Local voluntary observers (generally under local supervision by various institutions or NGOs) have been trained to process stranded cetaceans under a common standardised protocol. An annual synthesis of all stranding events reported in France is produced by ULR (Van Canneyt *et al.*, 2009, 2010).

Recent developments have been completed (H. Peltier, PhD thesis, 2011; Peltier *et al.*, 2012) to improve the monitoring value of long term stranding data series by modeling the drift of cetacean carcasses and constructing a set of predictions for cetacean stranding under a null hypothesis, defined as a homogenous and constant cetacean distribution across study area (from northern North Sea, to southern Bay of Biscay) and period (1990-2009). An analysis of porpoise stranding data from Belgium, France, the Netherlands and the UK over the period 1990-2009 revealed an increase in long term stranding anomalies for harbour porpoise starting in the early 2000's (Peltier *et al.*, 2013). This increased stranding anomaly appeared first in the southern North Sea, then along the Channel and Bay of Biscay coasts, and finally along the eastern North Sea. Changes in harbour porpoise stranding anomaly were consistent with several local visual surveys and with the two SCANS surveys carried out in 1994 and 2005. Similarly French and UK common dolphin stranding data were analysed. Ultimately this work is aimed to develop cetacean population indicators based on stranding data to be incorporated in national and international monitoring strategies (Peltier *et al.*, in review).

Tissue bank and biological studies

Stranded cetacean and to a lesser extent by-catches are an invaluable source of biological samples. Health status, cause of death, body condition, population structure (heavy metals and contaminants, P. Mendez-Fernandez PhD thesis), age composition and reproductive status (Dabin *et al.*, 2008; Mannocci *et al.*, 2012) are documented.

During the last decade, by-catch in fisheries was diagnosed for 40% of the common dolphins and represented up to 80% during the multiple stranding events regularly observed along the Atlantic coast in winter. The analysis of ecological tracers, such as heavy metal, fatty acids, stable isotopes, suggests that common dolphins living on the continental shelf may represent a separate management unit (Caurant *et al.*, 2009). The impact assessment of by-

catch on the common dolphin population by demographic and management oriented modelling reveals that current by-catch would be unsustainable under the hypothesis of the neritic common dolphins constituting a separate conservation management unit (Mannocci *et al.*, 2012). The common dolphin neritic unit would be decreasing at a yearly rate of -4%.

Large whales (fin whale, sperm whale, minke whale) recorded stranded were mostly identified as related to vessel strikes. A closer examination of the stranding time series of stranded beaked whale along the coast of France during the period 1970-2010 suggests that in several instances, events occurred in short series of 2 to 8 animals reported from fairly restricted stretches of coastline, suggesting unusual mortality events, plausibly in relationship with naval exercises (Dabin *et al.*, 2011).

Field surveys have reported a general shift in harbour porpoise distribution in European waters during the last 15 years, including a comeback along the coasts of France. In a study in progress, the University of Brest and Oceanopolis analysed the genetic polymorphisms at a fragment of the mitochondrial control region (mtDNA CR) and at 7 nuclear microsatellite loci for 52 animals stranded and by-caught between 2000 and 2010 along Atlantic French coasts. The analysis of nuclear and mitochondrial genomes has led to contrasting results. The mtDNA revealed two genetically distinct groups, one closely related to the Iberian and African harbour porpoises, and the second group related to individuals from the more northern waters of Europe. In contrast, nuclear polymorphisms did not reveal such a group distinction. Nuclear markers suggested that harbour porpoises behaved as a random mating unit along the Atlantic coasts of France. The difference between the two kinds of markers can probably be explained by the difference in their heritability, the mtDNA being maternally inherited in contrast to nuclear loci that are bi-parentally inherited. The results provide evidence that a major proportion of the animals sampled are admixed individuals from the two genetically distinct populations previously identified along the Iberian coasts and in the North East Atlantic. The French Atlantic coasts are clearly the place where these two previously separated populations of harbour porpoises are now meeting. It is strongly suspected that the present shifts in distribution of harbour porpoises around French coasts may be caused by habitat changes that will need to be further studied.

By-catch studies

By-catch in French fisheries has been regularly studied since 2007 in the application of the EU regulation 812/2004. Observers on board are used in pelagic trawling and set net fisheries in those areas fished within the Bay of Biscay. The tuna fisheries and bass fisheries both may cause by-catch (mainly common dolphins), and the average annual quantities are now well known. By-catch of porpoises, as well as some by-catch of striped dolphins and common dolphins, exists in the Bay of Biscay and in the western inshore fishing areas of the Iroise Sea. The observations on board vessels have provided an extrapolated estimate of some hundreds of porpoise caught annually in set nets from French vessels during recent years in the Bay of Biscay.

A programme named INPECMAM has been funded and agreed between the fishermen, the Iroise sea MPA, University of Brest, the National Natural History Museum and Oceanopolis to work on the by-catch of marine mammals (cetaceans and seals) and the depredation in set net fishery in the Iroise sea. The programme started in 2012 and is scheduled to finish at

the end of 2013. For set net and pelagic trawl fisheries, observers for the EC regulation (812/2004) are deployed for vessels greater than 15 metres and through pilot studies for vessels less than 15 m. However, it was not possible to place observers on boats less than 8m for security reasons.

Some information on the by-catch rate of porpoise exists also for the set nets in the French fishing areas of the western part of the English Channel as a result of the FILMancet project. The present situation in the Bay of Biscay is not clearly established as the data for set nets are now of poorer quality over the last two years, but data provided by Spain (in their national report) seem to indicate that significant by-catch of porpoises was still occurring in the Bay of Biscay area during the year 2010. Synthesis of the knowledge on by-catch in the French areas of Bay of Biscay and the Celtic Seas have recently been achieved for the Marine Strategy Framework Directive (Morizur *et al.*, 2011a, b, c), and the documents are available on the internet.

c) Ireland

In December 2012 Ireland announced its intention to designate two new candidate Natura 2000 Special Areas of Conservation (cSACs) with cetacean qualifying features, in addition to those protected sites already in place under EU Natura 2000 provisions. The new sites announced were (i) Rockabill to Dalkey Island SAC off the Co. Dublin coast (i.e., western Irish Sea) for harbour porpoise, and (ii) the West Connacht Coast SAC for bottlenose dolphin. Details concerning these sites can be obtained via the following link: <http://www.npws.ie/protectedsites/specialareasofconservationsac/>.

Monitoring of the resident bottlenose dolphin population in the Lower River Shannon SAC has continued (Berrow *et al.*, 2010a), while line-transect surveys for harbour porpoise within two candidate SAC sites for this species are currently under way (i.e., in summer 2013). Additional systematic surveys by the Irish Whale & Dolphin Group (IWDG); University College Cork; Coastal & Marine Research Centre, Cork (CMRC); and Dulra Research (DR) continue to be carried out. Effort has concentrated mostly upon the south, west and east coasts with offshore surveys targeting the west of Ireland in particular. Impact monitoring of the Corrib gas pipeline and coastal development in Broadhaven Bay, Co. Mayo has involved vessel surveys and land-based watches (Anderwald *et al.*, 2012a, b). A standardised land-based monitoring scheme funded by the Irish government was also conducted at eight regional sites between mid 2010 and the end of 2012.

The PReCAST project (Policy and Recommendations from Cetacean Acoustics, Surveying and Tracking, 2008-2012) was completed in December 2012. This research was a partnership between IWDG and the Galway-Mayo Institute of Technology (GMIT). It aimed to provide robust scientific data to support conservation policy and provide guidance to state agencies in implementing national and international obligations and in so doing to build national capacity in the area of automated assessment and monitoring wildlife populations. PReCAST was funded by the Marine Institute under the NDP Sea Change initiative and the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht. Cetacean relative abundance and distribution data from this project and a number of preceding government-funded surveillance programmes have recently been published in

the “Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters: 2005-2011”. This publication represents the culmination of six years of research involving over 1,000 days at sea and over 5,000 hours of survey effort. The Atlas is available for download via the following link:

<https://dl.dropboxusercontent.com/u/21374026/Marine%20Atlas%20Med%20Res.pdf>

Standardised dedicated inshore boat-based surveys of the northwest, west and southwest were carried out between August and October 2010 by IWDG, under contract from the Irish government. A total of 92 sightings were made of a total of 528 individuals of at least five species (Ryan *et al.*, 2010). Density and abundance estimates were derived for common dolphins in the west survey area (4.56 individuals/km²) equivalent to an abundance estimate of 5,254 (CV = 0.44) and in the southwest survey area (2.44 individuals/km²), equivalent to an abundance of 2,812 (CV = 0.45). These systematic regional boat-based line transect surveys were extended into the Irish Sea in 2011, with two survey blocks covered off the north-east and east coasts respectively, and density/abundance estimates for harbour porpoise were derived. Further identical surveys were undertaken in 2012 off the northwest (Donegal) coast.

A population assessment of the bottlenose dolphins living in the Lower River Shannon cSAC was undertaken (Shannon Dolphin & Wildlife Foundation, SDWF) between July and October 2010 (Berrow *et al.*, 2010). During 12 transects, a total of 64 dolphin groups were encountered with 547 individuals recorded. The proportion of dolphins with identifiable marks (Grade 1 only) ranged from 0.60 to 0.63. The estimated abundance of marked individuals was elevated depending on the estimated proportion of marked individuals in the population to give a final estimate of 107 (CV=0.12). Previous abundance estimates for bottlenose dolphins in the Lower River Shannon cSAC ranged from 114 in 2008 to 140 in 2006. This suggests that, within the power of the survey technique, the population of bottlenose dolphins in the Lower River Shannon cSAC is relatively stable. Dedicated surveys were made in other areas around the coast of Ireland at different scales, mostly carried out in coastal areas and embayments (UCC, CMRC, DR), with some surveys extending to the edge of the continental shelf (IWDG, DR).

A genetic structure analysis using 62 biopsy samples from free ranging bottlenose dolphins and 23 necropsies from stranded animals, has revealed fine-scale population structure among three distinct populations (Mirimin *et al.*, 2011). The Shannon Estuary population appears to be genetically isolated from adjacent coastal areas, with the exception of four animals sampled from a small group of six dolphins that are now resident in Cork Harbour (south coast) indicating ongoing gene flow or recent dispersal between these two areas. A second genetically distinct aggregation was identified in the Connemara–Mayo region, where recent photo-ID studies have suggested that dolphins found in this area show a degree of site fidelity. The study found moderate nuclear (15 microsatellites) and low mitochondrial (544 bp of the control region) gene diversity in dolphins using the Shannon Estuary and the Connemara–Mayo region, while dolphins that stranded along the coast showed markedly higher levels of gene diversity at both classes of markers. Specifically, these stranded dolphins formed a third genetically distinct cluster, which may be part of a larger pelagic population, as also suggested by the high levels of gene diversity.

A number of organisations/individuals have used a variety of Platforms of Opportunity to collect sightings data in the waters around Ireland. These include IWDG (particularly ferry surveys in the Irish Sea), UCC (aboard fishing vessels), SDWF and Dulra Research (ecotourism vessels). Some of these data are effort related. Sightings data are archived at the National Biodiversity Data Centre in Waterford.

Successive independent observer programmes aboard pelagic fishing vessels were in operation during 2010, 2011 and 2012 (Marine Institute, MI/BIM), including a dedicated programme to investigate by-catch in pelagic trawls in compliance with EU Regulation 812 (e.g., McCarthy *et al.*, 2011). A further observer programme is under way in 2013-2014. No cetacean by-catch has been observed in any of the independent observer trips undertaken thus far aboard pelagic vessels since 2010.

The Cetacean Strandings Scheme, funded by the Irish government and managed and coordinated by IWDG, operates throughout the year around the entire coastline of Ireland (Northern Ireland and the Republic of Ireland). Records are received from IWDG members, NPWS Conservation Rangers and members of the public, usually by email or phone. All records are validated by the IWDG and published in the Irish Naturalists' Journal (e.g., O'Connell and Berrow, 2011). A total of 92 stranding records were reported during 2010. Ten species were identified with the most frequent being harbour porpoises (25%) and common dolphins (23.9%). Twenty strandings were of live animals representing 21.74% of total stranding incidents. This figure compares with 2008 and 2009 when live strandings accounted for 13.33% and 16.91%, respectively. A small number of stranded individuals have been recovered each year for post-mortem examination (IWDG, UCC).

In early 2013, reports gathered via local NPWS staff and the recording scheme indicated an unusual stranding event taking place along the north-west coast of Co. Mayo in the west of Ireland. Coordination and collaboration with the UK's stranding investigation programme at the Institute of Zoology London led to the recovery and full post-mortem examination of five out of at least 13 stranded common dolphins associated with this apparent event. Post-mortem examination results, which concluded that all dolphins concerned were stranded as a result of by-catch in a trawl fishery operation, were published on the NPWS website in May 2013 (see <http://www.npws.ie/publications/>). The current Cetacean Strandings Scheme continues to the end of 2013.

A spatially explicit model of cetacean and fisheries overlap is currently being developed (UCC). This model will be used to examine various factors that may contribute to cetacean by-catch. A number of testable hypotheses will be considered including: "random hypothesis" where cetaceans and fisheries overlap in a mechanical sense; "prey hypothesis" where cetaceans and fisheries share the same prey and are therefore attracted to the same area; and "attraction hypothesis" where cetaceans are attracted to fishing activity. "Hot spot" areas, with high potential for by-catch, will be identified and will be used to inform Ecological Risk Assessments for the Effects of Fishing for the waters around Ireland. Studies on diet of small cetaceans/fisheries interactions are on-going (UCC).

A PhD project (UCC/University of Plymouth) examining the population size, structure and habitat use of bottlenose dolphins in Irish coastal waters continues to proceed while an MSc

thesis looking at the impact of gas pipeline construction on cetacean habitat use using PAMs was completed (M. Coleman, 2011). The government-funded BWPAM project to examine the use of passive acoustic monitoring technologies for monitoring subsea canyon habitat use by beaked whales has been completed by IWDG/GMIT and Cornell University and report finalization is imminent. This was a 6-month pilot field study and is complemented by deployment of Deepwater C-POD on the M6 weather buoy in abyssal habitat to the west of the Porcupine Bank.

Measures under Ireland's action plan for cetaceans, the *Conservation Plan for Cetaceans in Irish Waters* (2009), have been progressing in the period June 2010 - June 2013. The plan identifies the primary pressures and the administrative and scientific gaps that pose a threat to the protection of cetaceans in Ireland, and identifies clear measures required to ensure such threats are addressed. It consists of five main programmes of measures presented in a delivery grid against which progress can be clearly measured. Many actions have been completed thus far including several species/site monitoring, research and management actions (e.g., SAC monitoring, regional cetacean monitoring, maintenance of a national stranding scheme, establishment of an Irish marine mammal database, case-specific risk assessments via the statutory consultation process). Details of a National Cetacean Protection Strategy have also been elaborated. Its three-pillared approach underpinned by the Conservation Plan focuses on (i) designating and monitoring SACs, (ii) ensuring general regulatory and administrative functions are sufficiently rigorous, and (iii) pursuing an integrated strategy for general surveillance of cetaceans. The Conservation Plan and its accompanying Delivery Schedule and National Cetacean Protection Strategy are available on the website of the National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht via the following link: <http://www.npws.ie/marine/marinemammals/cetaceans/>.

d) Spain

New estimates on population abundance

The analysis of the available sightings data in northern and northwestern Spanish waters has produced new estimates of abundance for harbour porpoises, bottlenose dolphins, sperm and fin whales in the area (López *et al.*, 2013a,b; Vázquez *et al.*, 2013). These analyses have applied spatial modelling techniques to the sightings collected from designed and non-designed surveys that have associated effort data. By pooling together the data gathered between 2003 and 2011 by nine different organisations it has been possible to obtain uncorrected abundance estimates that do not take into account possible availability, perception and responsive movement biases and which are therefore likely to be underestimates. López *et al.* (2013b) estimated a total of 683 (CV=0.63, 95%CI: 345-951) harbour porpoises, while López *et al.* (2013a) obtained a figure of 10,687 (CV=0.26, 95%CI: 4,094-18,132) bottlenose dolphins. For fin whale (*Balaenoptera physalus*) the estimate was 10,267 (CV=0.048, 95%CI: 9,507-11,101) while for sperm whale was 865 (CV=0.12, 95%CI: 767-1,041) (Vázquez *et al.*, 2013).

Photo-ID studies have identified ca. 261 individual bottlenose dolphins over the period 2006-2011 in Galician waters (López *et al.*, 2012). The authors considered that approximately one third of the animals (n=78) belong to the separate coastal resident population since they have been resighted over the years, although the low percentage of

resightings would indicate that only part of this population has been identified so far (García *et al.*, 2011). Evidence exists as well of the existence of groups of bottlenose dolphins in the Basque Country, which show a certain degree of residence (López *et al.*, 2012).

Threats

The strandings series in Galicia (data of the Coordinadora para o Estudio dos Mamíferos Mariños (CEMMA), available since 1990) and northern Portugal (data of the Sociedade Portuguesa de Vida Selvagem (SPVS), available since 2000) include a total of 319 harbour porpoises for the period 1990-2010 (Figure 4). Read *et al.* (2012) analysed the information available and estimated that 11% of the Iberian harbour porpoise population (SCANS-II estimate) could be dying annually due to fisheries interactions.

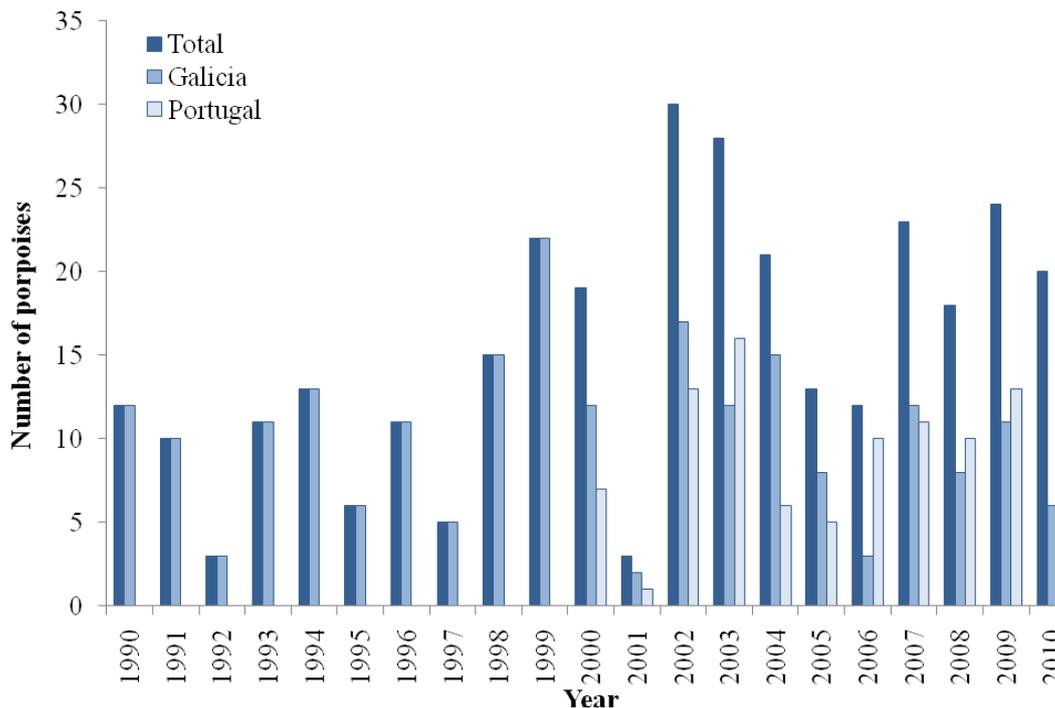


Fig. 4. Time series of harbour porpoise strandings in Spain and Portugal (reproduced from Read *et al.*, 2012)

López *et al.* (2012) used Galician and northern Spanish stranding data to calculate a by-catch estimate for harbour porpoises and obtained a figure of 233 animals in the 1990-2011 period. This number represents 34.1% (95% CI 17.4-42.6%) of the López *et al.* (2013b) estimated total abundance in the area.

Despite the large difference between the two estimates, both studies highlight that the by-catch mortality is most likely to be unsustainable for the population.

Goetz *et al.* (in press) used interview data to investigate interactions of cetaceans with Spanish and Portuguese fishing vessels in Galicia and Northern Portuguese waters. Their results indicate that cetaceans interact frequently with fishing vessels, mostly with negative consequences (e.g. by causing gear damage and becoming entangled in fishing gear). In Galician fisheries, significant economic loss and high by-catch rates were only reported as a

result of bottlenose dolphins damaging artisanal coastal gillnets, while reported high catch loss arose from common dolphins scattering fish in purse seine fisheries. High cetacean by-catch mortality (mainly of common dolphins) was reported in trawl fisheries, while coastal set gillnets also reported common and bottlenose dolphin mortality.

Diet studies

Diet analyses of all marine mammal species stranded and by-caught in Galicia have been carried out since 1990 and the long time series have allowed the testing of commonly held hypothesis on the feeding ecology of some species. Santos *et al.* (2013) used the stomach contents from 514 stranded and by-caught common dolphins collected over two decades in Galicia (NW Spain) to test for evidence of “preference” for sardine, blue whiting and hake, the main prey species in the diet. Although the relationships between dietary importance and annual indices of abundance for these three prey species do not conclusively confirm either opportunistic or selective predation, the authors found more evidence for the former. Santos *et al.* (in press) quantified predation by common, striped, bottlenose dolphins and harbour porpoises in Atlantic Iberian shelf waters and their results indicate that cetaceans probably have little influence on sardine population dynamics but that they could have a significant impact on hake populations.

In addition, Santos *et al.* (in press) analysed all available stomach contents of long-finned pilot whales stranded in Portugal, Galicia (northwest Spain) and Scotland from 1990 to 2011 (n= 48). Their results confirm that cephalopods are the main prey of this species, as has been reported in the literature for other areas but it appears that, in the northeast Atlantic, ommastrephid squid are replaced as the main prey by octopods at lower latitudes.

Stable isotope (N, C) ratios and Cadmium levels revealed long-term ecological segregation (specifically in diet / trophic level and foraging habitat) between common dolphins, striped dolphins, harbour porpoises, bottlenose dolphins and pilot whales in waters of the NW Iberia (Mendez *et al.*, 2013).

Population structure

Results from genetic analysis indicate that Iberian long-finned pilot whales show a degree of separation from other North Atlantic populations of the species (Monteiro *et al.*, 2013).

e) Portugal

Vessel surveys have been undertaken in northern Portugal by SPVS (Sociedade Portuguesa de Vida Selvagem, Wildlife Portuguese Society) and Escola de Mar (Sea School), with land-based observations made in central and southern Portugal. In 2007 and 2008, Escola de Mar conducted a total of 63 boat-based visual surveys from three different geographic locations, Nazaré, Peniche and Sesimbra, and as a result, 45 independent sightings of cetaceans were recorded. The most frequent small cetacean species off the Portuguese mainland coast was the short-beaked common dolphin followed by bottlenose dolphin and striped dolphin (Brito *et al.*, 2009). Overall, the small delphinid community along the central coast of Portugal is similar to the one that can be found along the Iberian shore (Brito *et al.*, 2009). Data from the vessel surveys and land based surveys from SPVS performed between 2003 and 2008 was recently compiled in a technical report aiming at establishing baseline information on abundance and distribution of cetaceans along the

entire Portuguese Mainland waters (Santos *et al.*, 2012). The data were introduced in the LIFE+ MarPro database, presently including more than 1100 sightings using data collected by SPVS and during SAFESEA and MarPro projects. The LIFE+ MarPro database is presently being used to create models to help identify hot-spot areas, and to relate the occurrence of cetaceans with habitat and oceanographic features. Using the SPVS data and the SAFESEA and LIFE+ MarPro data, it has already been possible to estimate near shore and offshore abundances of seven cetacean species out of the 25 cetacean species with confirmed occurrence in Portuguese Mainland waters (LIFE+ MarPro Midterm Report, 2013).

Population genetic analyses have been conducted on common dolphin populations inhabiting near-shore waters of the Portuguese mainland coast (Monteiro, 2007; Amaral *et al.*, 2007, 2012; A. Moura PhD study, University of Durham). Tissue samples were collected from stranded animals along the Portuguese mainland coast, comprising a total of 45 (35 from the northern and central coasts and 10 from the southern coast). 630 bp of the mitochondrial DNA (mtDNA) control region and 1121 bp of the mtDNA cytochrome *b* gene were PCR amplified and sequenced. Measures of genetic diversity obtained were within the range described for other cetacean species and no significant genetic differentiation was observed, thus meaning that a single common dolphin population inhabits the Portuguese mainland coast (Amaral *et al.*, 2007). These samples have been included in a broader phylogeographic study, including *D. delphis* from the Atlantic, the Pacific and Indian Oceans, *D. capensis* from the Pacific and *D. capensis tropicalis* from the Indian Ocean. Preliminary results of this study, which was based on sequences from the mitochondrial cytochrome *b* gene, indicate that two different groups/populations exist in the Northeast Atlantic, with common dolphins off the Portuguese mainland coast included in both groups. These preliminary results also seem to indicate that the current taxonomy within the genus *Delphinus* is not verified in genealogical lineages, and this has important implications for stock management and conservation policies. Further analyses have been conducted in order to clarify the taxonomic status of common dolphin populations across their geographical distribution, and have found marine productivity and sea surface temperature to be correlated with genetic structure, with isolation occurring by distance (Amaral *et al.*, 2012).

Population genetics analysis has also been performed recently on long-finned pilot whales (*Globicephala melas*) by Monteiro *et al.* (in prep) using samples from the Northern Iberian Peninsula, and from six populations in the North Atlantic. Sequence polymorphism and geographical variation at a putatively neutral locus (mitochondrial control region) and two adaptive loci (MHC DRA and DQB) were investigated. For the mtDNA locus, haplotype (0.56 ± 0.04) and nucleotide ($0.22\% \pm 0.18\%$) diversities were low compared to other abundant widespread cetaceans. In contrast, there were high and significant levels of mtDNA differentiation between most populations from the North Atlantic, indicative of genetic structure at both regional and oceanic scales. MHC analysis revealed three alleles at each locus, with a nucleotide diversity of 0.56 ± 0.42 and 4.63 ± 2.40 for DRA and DQB loci, respectively. Patterns of population divergence from the MHC confirmed Iberian whales as a separate population ($0.07 < F_{ST} < 0.18$, $p < 0.05$ between Iberia and other populations, across both loci). Structure patterns within mtDNA could be related to the social structure presented by this species and associated to high levels of female philopatry. Regarding MHC loci, the occurrence of historical balancing selection was evident (especially in the DQB locus), as shown by the trans-specific allele sharing and the $d_N:d_S$ ratio. However, although

historically it seems that balancing selection has an important role at shaping population diversity and divergence, the structure patterns across populations may either be due to local selection pressures for specific pathogens/ parasites or could result from evolutionary forces as gene flow or drift that may be masking contemporary signatures of selection.

The third species upon which a population genetics analysis has been undertaken recently is the bottlenose dolphin (Fernandez *et al.*, 2012) from the Northern Iberian Peninsula. Genetic relationships were evaluated between resident populations of dolphins from southern Galicia (NW Spain) and from the Sado estuary (S Portugal), and also their relationship with dolphins inhabiting neighbouring areas. A total of 91 skin and muscle samples were taken from stranded and biopsied animals between 1994 and 2008 in southern Galicia (N = 29), the Sado estuary (N = 5), and five other geographical locations (N = 57) including sites around the Iberian Peninsula, the Canary Islands, and the Azores. Individuals were genotyped at 10 microsatellite loci and sequenced at the highly variable mitochondrial control region. From individual-based analyses of microsatellite data, dolphins from southern Galicia and the Sado estuary were assigned to an individual genetic population, although nine dolphins were identified as possible migrants between putative populations as their genetic makeup did not correspond with their geographical stranding location. Pairwise estimates of genetic differentiation (F_{ST}) based on mitochondrial and nuclear DNA also revealed genetic differences between populations. The existence of fine-scale population substructure should be considered in the future designation of Special Areas of Conservation (SACs) for the species, as required by the European Habitats Directive.

The bottlenose dolphin that inhabits the Sado estuary is the only resident population in mainland Portugal. Around 25 individuals live in the estuary although the population has been in decline for some years (Dos Santos *et al.*, 2010). An action plan for the safeguard and monitoring of the resident population of bottlenose dolphins from the Sado estuary has been put in place by ICNF (previously called ICNB) since 2010. The main objective of this action plan is the protection and maintenance of this population through the improvement of its habitat quality. General objectives include: 1) Improvement of the conservation status of the bottlenose dolphin population; 2) Monitoring the environmental quality of the dolphins' habitat and 3) Involvement of the public opinion and local stakeholders for the urgent need to improve the environmental quality of the estuary and the protection of this resident population.

Several projects are already in place and these include: monitoring of the resident population; evaluation of the impact of maritime traffic on the resident population of bottlenose dolphins; habitat use inside the estuary by the resident bottlenose dolphins; habitat use outside the estuary and interactions with other coastal small dolphins (including coastal bottlenose dolphins; genetic and toxicological characterization of the resident population, evaluation of the estuary carrying capacity in terms of numbers of dolphin watching companies authorised,; impact of fishing activities in the estuary on the resident population of bottlenose dolphins; environmental awareness campaigns in local schools; and publication of a children's story book about the Sado dolphins.

Finally, in relation to recent genetic studies, it is important to refer the work undertaken by Fontaine *et al.* (2007, 2010), working with samples of harbour porpoise, where it is proposed that Iberian porpoises may be isolated from the rest of the European populations due to climatic events that have influenced the Iberian waters. A new paper by Fontaine *et al.* (in prep) has analysed the genetic polymorphism of microsatellite loci (n=767) together with sequences from a large portion of the mitochondrial genome (5,085 base-pairs, n=81) for a large sample covering the entire distribution of harbour porpoise. In this paper, the existence of three ecotypes of harbour porpoises is proposed, equally divergent on the mitochondrial genome, including one in the Black Sea (*P. p. relicta ssp.*), another on the European continental shelf (*P. p. phocoena ssp.*), and a third thus far overlooked, specialized in the upwelling zones of Iberia and NW Africa (*P. p. meridionalis ssp. nova*). A highly asymmetric gene flow was detected between the two Atlantic ecotypes and an admixture zone at the contact zone in the northern Bay of Biscay.

A formal stranding scheme covers the entire Portuguese coast, and strandings are reported to the Instituto da Conservação da Natureza e das Florestas (ICNF), and on some of these, a post-mortem examination is made. The last strandings summary was published for the years 1989-94 (Sequeira *et al.*, 1996), and an update up to 2012 will be produced later this year. This stranding scheme is divided into several regional networks, and a consortium of two Universities (Aveiro and Minho University) together with SPVS is responsible for the systematic monitoring of three-quarters of the Mainland coast with more than 1500 animals collected in the last 13 years (over 300 animals in 2012 and the first half of 2013). All tissue samples collected since 2000 and strandings data are presently archived in the Portuguese Marine Animal Tissue Bank (MATB – Portugal). This infrastructure is officially the first Marine Animal Tissue Bank in Portugal with facilities in the north of Portugal, in the Centre, and in Algarve. In 2013, new storage facilities will be built in Minho University and Aveiro University.

The SafeSea project began in 2008 and during a 3-year period, has been collecting scientific data concerning small cetacean population status, and incidental captures of cetaceans in gillnets, purse-seine and beach purse-seine fisheries. The project has also involved the testing of deterrent devices (pingers and acoustic enhanced nets) in order to reduce incidental capture of cetaceans. Simultaneously the project has worked to increase the awareness of local fisherman communities towards a more sustainable exploitation of sea resources and to the conservation of threatened species. This project is a collaboration between Universidade do Minho, The Portuguese Wildlife Society (SPVS), CEMMA in Galicia, IMR (Institute of Marine Research) in Norway, and two fisheries producers (VianaPesca and Centro Litoral).

The SafeSea project (J. Vingada, SPVS) covers the central-northern coast of Portugal (about 300 km), between the village of São Martinho do Porto and Caminha. The area covered extends from the coastline to the 200-metre contour (30 to 50 km off the coast).

During the first year of the project, interactions between cetaceans and fisheries were evaluated, based on interviews with boat captains, on-board observers, and voluntary logbooks. At the same time, the evaluation of the distribution and abundance of cetaceans was initiated using three approaches: watches from coastal vantage points, opportunistic

vessel surveys, and aerial surveys. The information collected during the first year was then used to help define the field trials with pingers and acoustic nets, as well as to make a cost/benefit analysis of the use of deterrent devices in Portuguese artisanal fisheries.

By-catch has been evaluated by use of different methodologies: on-board observers, interviews with boat captains, voluntary logbooks, tag and release of dead dolphins at sea, and a trial using electronic monitoring devices developed at Minho University.

Field trials with Fumunda pingers were carried out in three types of fisheries: purse-seine, gillnets and beach purse-seine. In each fishery, different ways to use pingers and also two types of pingers (10 kHz and 70 kHz models) were tested. These were followed by trials using acoustic enhanced gillnets and trammel nets.

Since 2011, a LIFE+ funded project (MARPRO) is in place, aiming at establishing SCIs for both seabirds and cetaceans (harbour porpoises and bottlenose dolphins) in the Portuguese EEZ. The project LIFE+ MARPRO is co-financed by the LIFE programme as a result of a partnership between the Aveiro University, Minho University, SPEA (Portuguese Society for the Protection of Birds), IPIMAR (Portuguese Fisheries Institute) and CNF.

This Life+ project is a continuation of the SafeSea project, covering the entire Portuguese mainland coast. Apart from the final goal of defining new marine SCIs, until 2015 the Life+ MarPro project includes 1) annual systematic surveys using aerial census, vantage points and offshore opportunistic platforms; 2) evaluation of by-catch mortality and interactions in all Portuguese fisheries; 3) increments to the use of pingers in gillnet and trammel net fisheries, in purse-seine and beach purse-seine fisheries; 4) implementation of the use of Manual/Code of Practice in all fisheries; 5) improvements to the stranding networks response and to the marine animals rehabilitation centres; 6) definition of a Sustainable Financial Mechanism for after-LIFE actions; and 7) definition of management plans for future Marine Offshore Natura 2000 sites.

Presently, the University of Aveiro is coordinating a FEDER-FCT project entitled “Cetaceans as marine ecosystem health sentinels” lasting between 2013 and 2015. Apart from the University of Aveiro, this research involves the University of Minho, the Veterinary Faculty of the Lisbon Technical University, the SPVS, and CEMMA (Galicia, Spain). This project will use samples stored in the MATB and it represents the first systematic effort for assessing population status and health of coastal cetacean species in the western coast of the Iberian Peninsula, not only to monitor the risks to the populations themselves, but also to evaluate their role as sentinels of the health of marine ecosystems from the Iberian Atlantic basin. The methodological approach, grounded on conservation medicine, will benefit from the use of epidemiological methods to determine potential population-level effects on marine wildlife.

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BIBLIOGRAPHY (all cetaceans)

- Amaral, A.R., Luciano B. Beheregaray, L.B., Bilgmann, K., Dmitri Boutov, D., Freitas, L., Robertson, K.M., Sequeira, M., Stockin, K.A., Coelho, M.M., Luciana, M., and Møller, L.M. (2012) Seascape genetics of a globally distributed, highly mobile marine mammal: the short-beaked common dolphin (Genus *Delphinus*). *PLoS One*, 7(2).
- Amaral, A.R., Sequeira, M., Cedeira-Martínez, J., and Coelho, M.M. (2007) New insights on population genetic structure of *Delphinus delphis* from the northeast Atlantic and phylogenetic relationships within the genus inferred from two mitochondrial markers. *Marine Biology*, 151: 1967-1976.
- Anderwald, P., Brandecker, A., Haberlin, D., Coleman, M., Collins, C., O'Donovan, M., Pinfield, R., and Cronin, M. (2012a) *Marine mammal monitoring in Broadhaven Bay 2011*. Progress Report to RSK Environment Limited Group. Coastal and Marine Research Centre, University College Cork, Ireland. 66pp.
- Anderwald, P., Evans, P.G.H., Dyer, R., Dale, A., Wright, P.J., and Hoelzel, A.R. (2012) Spatial scale and environmental determinants in minke whale habitat use and foraging. *Marine Ecology Progress Series*, 450: 259-274.
- Anderwald, P., Evans, P.G.H., Gygax, L. and Hoelzel, A.R. (2011) Role of feeding strategies and their role in seabird-minke whale associations. *Marine Ecology Progress Series*, 424: 219-227.
- Anderwald, P., Haberlin, D., Coleman, M.D., O'Cadhla, O., Englund, A., Visser, F., and Cronin, M. (2012b) Seasonal trends and spatial differences in marine mammal occurrence in Broadhaven Bay, north-west Ireland. *Journal of the Marine Biological Association of the U.K.*, 92: 1757-1766.
- Baines, M.E. and Evans, P.G.H. (2012) *Atlas of the Marine Mammals of Wales*. CCW Monitoring Report No. 68. 143pp.
- Bento, C. (2012) *Evaluation of Morbillivirus prevalence cetaceans stranded along the Portuguese Coast*. MSc Thesis in Veterinary Medicine. Faculdade de Medicina Veterinária da Universidade Técnica de Lisboa, 80pp [in Portuguese].
- Berrow, S., O'Brien, J., Groth, L., Foley, A., and Voigt, V. (2010) *Bottlenose Dolphin SAC Survey 2010*. Report to the National Parks and Wildlife Service. Shannon Dolphin and Wildlife Foundation. 24pp.
- Bird, A. (2012) *Geographic Variation in the Whistle Characteristics of Bottlenose Dolphins (Tursiops truncatus) between Cardigan Bay, Wales, the Shannon Estuary, Ireland, the Molène Archipelago, France and the Sado Estuary, Portugal*. MSc Thesis, University of Bangor. 61pp.
- Brito, C., Vieira, N., Sá, E. and Carvalho, I. (2009) Cetaceans' occurrence off the west central Portugal coast: a compilation of data from whaling, observations of opportunity and boat-based surveys. *Journal of Marine Animals and Their Ecology*, 2: 1-4.
- Caurant, F., Chouvelon, T., Lahaye, V., Mendez-Fernandez P., Rogan E., Spitz J., and Ridoux V. (2009) The use of ecological tracers for discriminating dolphin population structure: the case of the short-beaked common dolphin *Delphinus delphis* in European Atlantic waters. IWC SC/61/SM34. 11pp.
- Certain, G., Masse, J., Van Canneyt, O., Petitgas, P., Doremus, G., Santos, M.B. and Ridoux, V. (2011) Investigating the coupling between small pelagic fish and marine top predators using data collected from ecosystem-based surveys. *Marine Ecology Progress Series*, 422: 23-39.
- Certain, G., Ridoux, V., Van Canneyt, O. and Bretagnoile, V. (2008) Delphinid spatial distribution and abundance estimates over the shelf of the Bay of Biscay. *ICES Journal of Marine Science*, 65: 656-666.
- Cheney, B.J., Thompson, P.M., Ingram, S.N., Hammond, P.S., Stevick, P.T., Durban, J.W., Culloch, R.M., Elwen, S.H., Mandleberg, L., Janik, V.M., Quick, N.J., Islas-Villanueva, V., Robinson, K.P., Costa, M., Einfeld, S.M., Walters, A., Philips, C., Weir, C.R., Evans, P.G.H., Anderwald, P., Reid, R.J., Reid, J.B., and Wilson, B. (2013) Integrating multiple data sources to assess the distribution and abundance of bottlenose dolphins (*Tursiops*

truncatus) in Scottish waters. *Mammal Review*, 43: 71-88.

CODA (2009) *Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA)*. 164pp., with appendices.

Dabin, W., Cossais, F., Pierce, G.J. and Ridoux, V. (2008) Do ovarian scars persist with age in all Cetaceans: new insight from the short-beaked common dolphin (*Delphinus delphis*, Linnaeus, 1758). *Marine Biology*, 156(2): 127-139.

Dabin, W., Doremus, G, Gonzalez, L., Demaret, F., Van Canneyt, O. and Ridoux, V. (2011) Stranded beaked whales in France: 1970-2010. .IWC SC/63/SM11. 11pp.

Deaville, R. and Jepson, P.D. (compilers) (2011) *UK Cetacean Strandings Investigation Programme*. Final Report to Defra for the period 1st January 2005 – 31st December 2010. (Contract numbers CR0346 and CR0364). Institute of Zoology, London. 98pp.

Dos Santos, M.E., Couchinho, M.N., Luís, A.R. and Gonçalves, E.J. (2010) Monitoring underwater explosions in the habitat of resident bottlenose dolphins. *Journal of the Acoustical Society of America*, 128(6): 3805-3808.

Eisfeld, S.M. and Lott, R. (2013) *Research on occurrence, distribution, site fidelity, habitat use and behaviour of small cetaceans, with particular emphasis on Risso's dolphin, around Bardsey Island, North Wales. Risso's dolphins in North Wales*. CCW Contract Science Report No. 1021. 26pp.

Evans, P.G.H. (2012) Determining size, range, distribution, status and net productivity (growth) rates of populations of marine mammals in Welsh waters and a summary of the pressures acting upon these populations. *CCW Policy Research Report*. Countryside Council for Wales, Bangor. 46pp.

Evans, P.G.H. and Baines, M.E. (2013) *A methodology to assess the sensitivity of marine mammals to different fishing activities and intensities*. CCW Policy Research Report No 12/6. 83pp.

Evans, P.G.H. and Bjørge, A. (2013) Impacts of climate change on marine mammals. *Marine Climate Change Impacts Partnership (MCCIP) Annual Report Card 2011-2012 Scientific Review*: 1-34.

Feingold, D. and Evans, P.G.H. (2012) *Sea Watch Foundation Welsh Bottlenose Dolphin Photo-Identification Catalogue 2011*. CCW Marine Monitoring Report No: 97: 1-262.

Feingold, D. and Evans, P.G.H. (2013) *Bottlenose Dolphin and Harbour Porpoise Monitoring in Cardigan Bay and Pen Llŷn a'r Sarnau Special Areas of Conservation*. Report to Countryside Council for Wales. 86pp.

Fernandez, P. M. (2012) *Ecological segregation inferred using chemical tracers and contamination assessment of five toothed whales in the Northwest Iberian Peninsula*. PhD thesis, Universidade do Minho.

Fernandez, R. (2010) *Ecology of the bottlenose dolphin, Tursiops truncatus (Montagu 1821), in Galician waters, NW Spain*. PhD thesis, Universidade de Vigo.

Fernández, R., García-Tiscar, S., Santos, M.B., López, A., Martínez-Cedeira, J. A., Newton, J. and Pierce, G.J. (2011a) Stable isotope analysis in two sympatric populations of bottlenose dolphins *Tursiops truncatus*: evidence of resource partitioning? *Marine Biology*, 158: 1043–1055.

Fernández, R., Santos, M.B., Pierce, G.J., Llavona, A., López, A., Silva, M.A., Ferreira, M., Cermeño, P., Lens, S. and Piortney, S.B. (2011b) Fine-scale genetic structure of bottlenose dolphins, *Tursiops truncatus*, in Atlantic coastal waters of the Iberian Peninsula. *Hydrobiologia*, 670: 111-125 (Published online DOI 10.1007/s10750-011-0669-5).

Ferreira, M., Marçalo, A., Nicolau, L., Araújo, H., Santos, J., Pinheiro, C., Lopes, T., Mendes, S., Vaqueiro, J., Medina, P., Cascalho, A., Sequeira, M., Eira, C., and Vingada, J. (2012). Current state of the stranding and rehabilitation networks in Continental Portugal. Annex to the LIFE+ MarPro Midterm Report PT/NAT/00038 [in Portuguese].

Fontaine, M.C., Baird, S.J., Piry, S., Ray, N., Tolley, K.A., Duke, S., Burkun, A., Jr., Ferreira, M., Jauniaux, T.,

Llavona, A., Ozturk, B., Ozturk, A.A., Ridoux, V., Rogan, E., Sequeira, M., Siebert, U., Vikingsson, G.A., Bouquegneau, J.M., and Michaux, J.R. (2007) Rise of oceanographic barriers in continuous populations of a cetacean: the genetic structure of harbour porpoises in Old World waters. *BMC Biology*, 5: 1-16.

Fontaine, M., Roland, K., Calves, I., Austerlitz, F., Tolley, K., Birkun, A., Ferreira, M., Jauniaux, T., Llavona, A., Öztürk, B., Öztürk, A., Ridoux, V., Rogan, E., Sequeira, M., Siebert, U., Vikingsson, G., Borrell, A., Michaux, J., and Aguilar, A. (in review) Postglacial climate changes and rise of three ecotypes of harbour porpoises in western Palearctic waters. *Global Change Biology*.

Fontaine, M.C., Tolley, K.A., Michaux, J.R., Birkun Jr., A., Ferreira, M., Jauniaux, T., Llavona, N., Öztürk, B., Öztürk, A.A., Ridoux, V., Rogan, E., Sequeira, M., Bouquegneau, J.-M., and Baird, S.J.E. (2010) Genetic and historic evidence for climate-driven population fragmentation in a top cetacean predator: The harbour porpoises in European waters. *Proceedings of the Royal Society B: Biological Sciences*, 277 (1695): 2829-2837.

García, N., Caldas, M., Palacios, G., Moldes, M., Leal, A., and López, A. (2011) Photoidentification and population movements of bottlenose dolphins, *Tursiops truncatus*, along the Galician coast, NW Iberia. Poster, 25th Annual Conference of the European Cetacean Society, Cadiz, Spain, 21-23 May, 2011.

Goetz, S., Read, F.L., Santos, M.B., Pita, C., and Pierce, G.J. (in press) Cetacean-fishery interactions in Galicia (NW Spain): results and management implications of a face-to-face interview survey with local fishers. *ICES Journal of Marine Science*.

Goulton, M. (2012) *A comparison of visual and acoustic survey data collected from 2005 to 2008 in the Cardigan Bay SAC for the harbour porpoise and bottlenose dolphins*. MSc thesis, University of Bangor. 73pp.

ICES (2012) "Report of the Working Group on Marine Mammal Ecology (WGMME)." ICES CM 2012/ ACOM: 27. 146pp.

Isojunno, S., Matthiopoulos, J. and Evans, P.G.H. (2012) Harbour porpoise habitat preferences: Robust spatio-temporal inferences from opportunistic data. *Marine Ecology Progress Series*, 448: 155-170.

Katara, I., Feijó, D., Bento, T., Figueiredo, I., Correia, M., Fernandes, A.C., Silva, D., Ferreira, A.L., Fernandes, P., Abreu, P., Prista, N., Wise, L., Azevedo, M., and Silva A. (2012) Capítulo II: IPMA contribution to the A.3 MARPRO report on the interactions between target species and fisheries. Annex to the LIFE+ MarPro Midterm Report PT/NAT/00038.

Law, R.J., Barry, J., Barber, J.L., Bersuder, P., Deaville, R., Reid, R.J., Brownlow, A., Penrose, R., Barnett, J., Loveridge, J., Smith, B., and Jepson, P.D. (2012a) Contaminants in cetaceans from UK waters: status as assessed within the Cetacean Strandings Investigation Programme from 1990 to 2008. *Marine Pollution Bulletin*, 64: 1485-1494.

Law R.J., Bolam T., James D., Barry J., Deaville R., Reid R.J., Penrose R., and Jepson P.D. (2012b) Butyltin compounds in liver of harbour porpoises (*Phocoena phocoena*) from the UK prior to and following the ban on the use of tributyltin in antifouling paints (1992-2005 & 2009). *Marine Pollution Bulletin*, 64(11): 2576-2580.

López, A., Vázquez, J.A., Martínez-Cedeira, J., Cañadas, A., Marcos, E., Maestre, I., Ruano, A., Laria, L., Llavona, A., Macleod, K., and Evans, P. (2013a) New abundance estimates for harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) in Northern Spanish Cantabrian and adjacent waters of Bay of Biscay (2003-2011). Poster. 27th Annual Conference of the European Cetacean Society, Setubal, Portugal, 8-10 April 2013.

López, A., Vázquez, J.A., Martínez-Cedeira, J., Cañadas, A., Marcos, E., Maestre, I., Ruano, A., Laria, L., Llavona, A., Macleod, K., and Evans, P. (2013b) Abundance estimates for harbour porpoise (*Phocoena phocoena*) in the Spanish area of the Iberian Peninsula Management Unit. International Whaling Commission SC/65a/SM20.

López, A., Vázquez, J.A., Martínez-Cedeira, J.A., Marcos-Ipiña, E., Laria, L., Maestre, I., Carbó, A., Llanova, A., Fernández, M., Díaz, J.I., Santos, L., Ruano, A., Fernández, R., and Méndez, P. (2012) Bases para el desarrollo de los planes de conservación de las especies de cetáceos protegidas en la Demarcación Marina Noratlántica. Ministerio de Agricultura, Alimentación y Medio Ambiente – Fundación Biodiversidad.

Mannocci, L., Augeraud-Veron, E., Barbraud, C., Dabin, W., Dupuy, J.-F., Ridoux, V. (2012) Assessing the impact of by-catch on dolphin populations: the case of the common dolphin in the Eastern North Atlantic. *PloS ONE* 7(2): e32615. doi:10.1371/journal.pone.0032615.

MarPro (2013) Code of Practice for mitigating interactions between Portuguese fisheries and cetaceans and seabirds. 36pp. Annex to the LIFE+ MarPro Midterm Report PT/NAT/00038 [in Portuguese].

McCarthy, A. Pinfield, R., Enright, J., and Rogan, E. (2011) Pilot observer programme in Irish pelagic trawl and gillnet fisheries: Implementing Council Regulation (EC) No 812/2004. University College Cork. Report to An Bord Iascaigh Mhara 24pp.

Méndez-Fernández, P., Bustamante, P., Bode, A., Chouvelon, T., Ferreira, M., López, A., Pierce, G.J., Santos, M.B., Spitz, J., Vingada, J.V., and Caurant, F. (2012) Foraging ecology of five toothed whale species in the Northwest Iberian Peninsula, inferred using carbon and nitrogen isotope ratios. *Journal of Experimental Marine Biology and Ecology*, 413: 150-158.

Méndez-Fernández P., Pierce, G.J., Bustamante, P., Chouvelon, T., Ferreira, M., González, A.F., López, A., Read, F.L., Santos, M.B., Spitz, J., Vingada, J.V., and Caurant, F. (2013) Ecological niche segregation among five toothed whale species off the NW Iberian Peninsula using ecological tracers as multi-approaches. *Marine Biology*. DOI 10.1007/s00227-013-2274-9.

Méndez-Fernandez, P., Webster, L., Chouvelon, T., Bustamante, P., Ferreira, M., González, A., López, A., Moffat, C., Pierce, G., Read, F., Russell, M., Santos, B., Spitz, J., Vingada, J., and Caurant, F. (in review) An assessment of trace element and persistent organic pollutant concentrations in toothed whale species off the NW Iberian Peninsula. *Science of the Total Environment*.

Mirimin, L., Miller, R., Dillane, E., Berrow, S.D., Ingram, S., Cross, T.F. and Rogan, E. (2011) Fine-scale population genetic structuring of bottlenose dolphins using Irish coastal waters. *Animal Conservation*, 15: 1469-1795.

Monteiro, S., Vingada, J.V., López, A., Pierce, G.J., Ferreira, M., Reid, R.J., Øien, N., Mikkelsen, B., and Piartney, S. (2013) Sequence polymorphism and geographical variation at neutral (mitochondrial) and adaptive (MHC) genes in Long-finned pilot whale (*Globicephala melas*) from North Atlantic. Oral presentation. 27th Annual Conference of the European Cetacean Society, Setubal, Portugal, 8-10 April 2013.

Morizur, Y., Demaneche, S., Fauconnet, L., Gaudou, O., and Badts, V. (2011a) *Les captures accidentelles de cétacés dans les pêches professionnelles françaises en 2010 : Contribution au rapport national sur la mise en œuvre du règlement européen (CE) No. 812/2004*. Rapport de contrat Ifremer, R.INT.STH/LBH/2011. Available at: <https://w3.ifremer.fr/archimer/doc/00065/17609/15132.pdf> (0.92 Mb).

Morizur, Y., Gaudou, O., Miossec, D., Toulboat, L. and Gamblin, C. (2011b) *By-catch of marine mammals in set nets of South of North Sea, of English Channel and of other parts of area VII: Results from French project Filmancet and from other French observation programs*. Rapport de contrat ifremer, R.INT.STH/LBH/2011. Available at: <http://archimer.ifremer.fr/doc/00035/14666/11967.pdf> (0.47 Mb).

Morizur, Y., Valery, L., Claro, F., and Van Canneyt, O. (2011c) *Captures accidentelles / SRM GDG*. DCSMM/état initial/contributions thématiques/pressions et impacts/IX.2 Captures accidentelles. Available at: <https://w3.ifremer.fr/archimer/doc/00065/17605/15128.pdf> (0.18 Mb).

Nuuttila, H.K. (2012) *Static Acoustic Monitoring of Cetaceans in Cardigan Bay, Wales*. PhD thesis, School of Ocean Sciences, University of Bangor. 201pp.

Nuuttila, H.K., Meier, R., Evans, P.G.H., Turner, J.R., Bennell, J.D., and Hiddink, J.G. (2013a) Identifying foraging behaviour of wild bottlenose dolphins (*Tursiops truncatus*) and harbour porpoises (*Phocoena phocoena*) with static acoustic dataloggers. *Aquatic Mammals*, 39(2), DOI 10.1578/AM.39.2.2013.

Nuuttila, H., Thomas, L., Hiddink, J., Meier, R., Turner, J., Bennell, J., Tregenza, N. and Evans, P.G.H. (2013b) Acoustic detection probability of bottlenose dolphins, *Tursiops truncatus*, with static acoustic dataloggers in Cardigan Bay, Wales. *Journal of the Acoustical Society of America* (in press).

Paxton, C.G.M., Scott-Hayward, L., Mackenzie, M., Rexstad, E., and Thomas, L. (2012) *Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resource*. Report to Joint Nature Conservation Committee. Centre for Research into Ecological and Environmental Modelling, University of St. Andrews. 175pp.

Peltier, H. (2011) *Cétacés et changements environnementaux : développement et tests d'indicateurs d'état de conservation en vue d'établissement de stratégies de surveillance*. Université de la Rochelle, La Rochelle, 243pp.

Peltier, H., Baagøe, H.J., Camphuysen, K.C.J., Czeck, R., Dabin, W., Daniel, P., Deaville, R., Haelters, J., Jauniaux, T., Jensen, L.F., Jepson P.D., Keijl, G. O., Siebert, U., Van Canneyt, O., and Ridoux, V. (2013) The stranding anomaly as population indicator: the case of harbour porpoise *Phocoena phocoena* in North-Western Europe. *PLoS ONE* 8(4): e62180. doi:10.1371/journal.pone.0062180.

Peltier, H., Dabin, W., Daniel, P., Dorémus, G., Van Canneyt, O., Huon, M., and Ridoux, V. (2012) The significance of stranding data as indicators of cetacean populations at sea: modeling the drift of cetacean carcasses. *Ecological Indicators*, 18:278-290.

Peltier, H., Dabin, W., Jepson, P. D., Deaville, R., Van Canneyt, O., Daniel, P., and Ridoux, V. (in review) The contribution of strandings data to monitoring and conservation strategies for cetaceans: developing spatially explicit mortality indicators for common dolphins *Delphinus delphis* in the North-East Atlantic. *Ecological Indicators*.

Read, F., Santos, M.B., González, A.F., López, A., Ferreira, M., Vingada, J., and Pierce, G.J. (2012) Understanding harbour porpoise (*Phocoena phocoena*) and fishery interactions in the north-west Iberian Peninsula. Final Report to ASCOBANS on grant SSFA/ASCOBANS/2010/4.

Richardson, H. (2012) *The effect of boat disturbance on the bottlenose dolphin (Tursiops truncatus) of Cardigan Bay in Wales*. MSc thesis, University College London. 71pp.10

Ryan, C., Berrow, S., Pierini, A., O'Brien, J., O'Connor, I., and McGrath, D. (2010) *Inshore Boat-based Surveys for Cetaceans*. Report to the National Parks and Wildlife Service. Irish Whale and Dolphin Group. 33pp.

Santos, J., Araújo, H., Ferreira, M., Henriques, A., Miodonski, J., Monteiro, S., Oliveira, P., Rodrigues, I., Duro, G., Oliveira, F., Pinto, N., Sequeira, M., Eira, C., and Vingada, J. (2012) Chapter I: Baseline estimates of abundance and distribution of target species. Annex to the Midterm Report of project LIFE MarPro PT/NAT/00038.

Santos, M.B., German, I., Correia, D., Read, F.L., Martinez-Cedeira, J., Caldas, M., López, A., Velasco, F, and Pierce, G.J. (2013) Long-term variation in common dolphin diet in relation to prey abundance. *Marine Ecology Progress Series*, 481: 249-268.

Santos, M.B., Monteiro, S.S., Vingada, J.V., Ferreira, M., López, A., Cedeira, J.A.M., Reid, R.J., Brownlow, A., and Pierce, G.J. (in press) Patterns and trends in diet of long-finned pilot whales (*Globicephala melas*) based on the analysis of stomachs contents of animals stranded on Northeast Atlantic coasts. *Marine Mammal Science*, DOI: 10.1111/mms.12015.

Santos, M.B., Saavedra, C., and Pierce, G.J. (in press) Quantifying the predation on sardine and hake by cetaceans in the Atlantic waters of the Iberian Peninsula. *Deep Sea Research II*.

SCANS-II (2008) *Small cetaceans in the European Atlantic and North Sea (SCANS II)*. Final report to the European Commission, under contract LIFE04NAT/GB/000245.

Sequeira, M., Inácio, A., Silva, M.A., and Reiner, F. (1996) *Arrojamentos de Mamíferos Marinhos da Costa Continental Portuguesa entre 1989 e 1994* [Marine mammal strandings along the continental Portuguese coast between 1989 and 1994]. Estudos de Biologia e Conserção da Natureza, 19. Instituto da Conservação da Natureza, Lisboa, Portugal. 52pp

Silva, M.A., Magalhães, S., Prieto, R., Santos, R.S. and Hammond, P.S. (2009) Estimating survival and abundance in a bottlenose dolphin population taking into account transience and temporary emigration. *Marine Ecology Progress Series*, 392: 263-276.

- Simon, M., Nuuttila, H., Reyes-Zamudio, M.M., Ugarte, F., Verfuß, U., and Evans, P.G.H. (2010) Passive acoustic monitoring of bottlenose dolphin and harbour porpoise, with implications for habitat use and partitioning. *Journal of the Marine Biological Association of the United Kingdom*, 90, 1539-1546.
- Sirmel, R. (2011) *Effects of Boat Traffic on the Behaviour of Bottlenose Dolphins, Tursiops truncatus (Montagu 1821), in Galician Waters, North-Western Spain*. MSc thesis, University of Southampton.
- Smith, J.A. (2010) *The Ecology of Cuvier's beaked whale, Ziphius cavirostris (Cetacea: Ziphiidae), in the Bay of Biscay*. PhD Thesis, University of Southampton.
- Thompson, K. (2012) *Variations in Whistle Characteristics of Bottlenose Dolphins (Tursiops truncatus) in Cardigan Bay, Wales*. MSc thesis, University of Bangor. 62pp.
- Van Canneyt, O., Dars, C., Gonzalez, L., and Dorémus, G. (2009) *Les échouages de mammifères marins sur le littoral français en 2008*. Rapport CRMM pour le Ministère de l'Écologie, de l'Énergie, du Développement Durable et de la Mer, Direction de l'eau et de la biodiversité, Programme Observatoire du Patrimoine Naturel: 31pp.
- Van Canneyt, P., Boudault, C., Dabin, W., Dorémus, G., and Gonzalez, L. (2010) *Les échouages de mammifères marins sur le littoral français en 2009*. Rapport ULR/CRMM pour le Ministère de l'Écologie de l'Énergie, du Développement Durable et de l'Aménagement du Territoire, Direction de l'Eau et de la Biodiversité, Programme Observatoire du Patrimoine Naturel, La Rochelle, 48pp.
- Vázquez, J.A., Martínez-Cedeira, J., López, A., Cañadas, A., Marcos, E., Ruano, A., Laria, L., Macleod, K., and Evans, P. (2013) Model based uncorrected abundance estimates for fin whale (*Balaenoptera physalus*) and sperm whale (*Physeter macrocephalus*) in Northern Spanish Cantabrian and adjacent waters of Bay of Biscay (2003-2011). Poster. 27th Annual Conference of the European Cetacean Society, Setubal, Portugal, 8-10 April 2013.
- Veneruso, G. and Evans, P.G.H. (2012) *Bottlenose Dolphin and Harbour Porpoise Monitoring in Cardigan Bay and Pen Llŷn a'r Sarnau Special Areas of Conservation*. CCW Marine Monitoring Report. Countryside Council for Wales, Bangor. 65pp.
- Vingada, J., Marçalo, A., Ferreira, M., Eira, C., Henriques, A., Miodonski, J., Oliveira, N., Marujo, D., Almeida, A., Barros, N., Oliveira, I., Monteiro, S., Araújo, H., and Santos, J. (2012) Chapter I: Interactions between target species and fisheries. Annex to the LIFE+ MarPro Midterm Report PT/NAT/00038 [in Portuguese].
- Yap, X., Deaville, R., Perkins, M.W., Penrose, R., Law, R.J., and Jepson, P.D. (2012) Investigating links between polychlorinated biphenyl (PCB) exposure and thymic involution and thymic cysts in harbour porpoises (*Phocoena phocoena*). *Marine Pollution Bulletin*, 64: 2168-2176.