

Agenda Item 5.5

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

New Agreement Area

Document 5.5.a

**Intersessional Working Group on
Research and Conservation Actions
Undertaken in the Extended
Agreement Area:
Update for the Period September
2014 to August 2015**

Action Requested

- Take note
- Give Guidance

Submitted by

Extension Area Working Group



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 SEPTEMBER 2014 TO AUGUST 2015**

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

Introduction

This aim of this group is to review the current research and conservation efforts undertaken 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, at AC20 in Warsaw in August 2013, and at AC21 in Gothenburg, Sweden in September 2014. The present report updates those, covering the last 12 months.

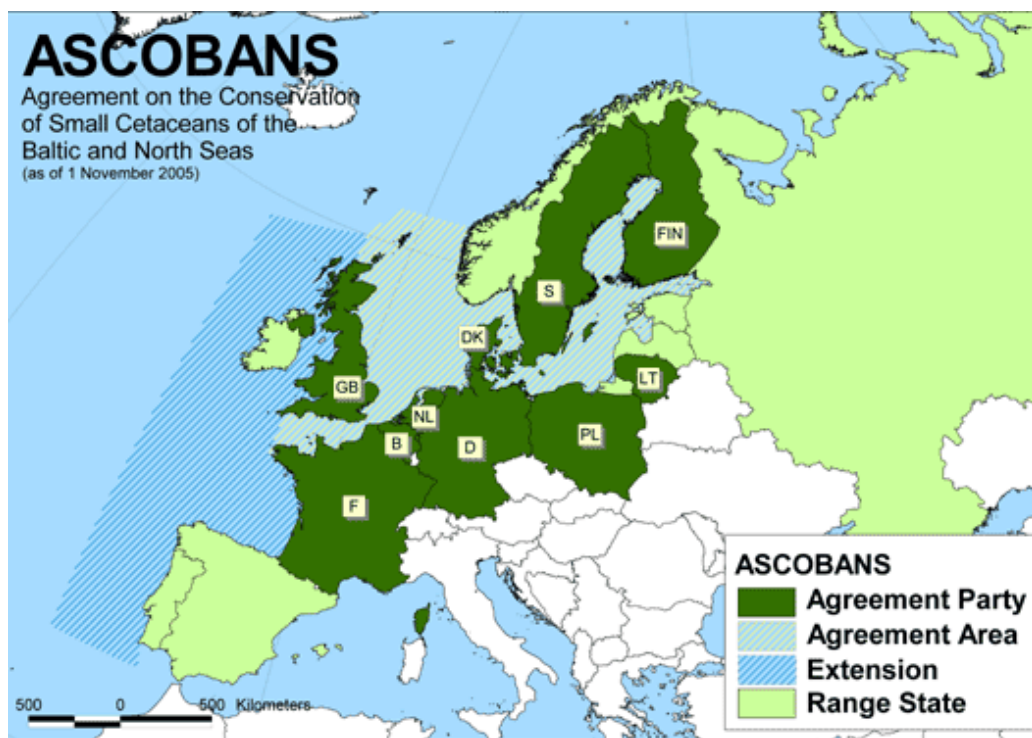


Fig. 1: Map of ASCOBANS Agreement Area showing Extension area covered by this Working Group

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

Marine Strategy Framework Directive

The UK published the first part of its Marine Strategy as required under the Marine Strategy Framework Directive in December 2012. This contains the characterisation of Good Environmental Status (GES) and associated targets and indicators in UK waters. Part two of the UK Marine Strategy outlining UK monitoring programmes was published in July 2014. The final part of the UK Marine Strategy, programmes of measures necessary to achieve GES, was consulted on during January-April 2015, and will be published in December 2015. Further information on implementation of the MSFD in the UK can be found on the UK government website¹.

Marine Protected Areas

Since 2013, the Joint Nature Conservation Committee (JNCC) has undertaken an analysis of the largest and most comprehensive set of data for harbour porpoise in UK waters, with the aim of identifying possible sites for SAC designation. The initial stages of this work completed in 2014 indicated that there are several potential sites around the UK. This work will continue throughout 2015, with the intention of carrying out a formal consultation on the potential sites by the end of the year.

Scotland:

The Marine Scotland-led Scottish MPA Project has so far designated 30 NC MPAs for a variety of marine habitats and species. These join the 29 MCZs designated in 2013 around England, Northern Ireland and Wales. Site information centres for the offshore sites can be viewed at: <http://jncc.defra.gov.uk/page-5269>. For further information on all NC MPA sites, visit the SNH webpages: <http://www.gov.scot/Topics/marine/marine-environment/mpanetwork>. For details of MPA search features and rationale for identification, please refer to both the UK's national report to ASCOBANS for 2014, and also see: [http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas-\(mpa\)/scottish-mpa-network-advice/](http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas-(mpa)/scottish-mpa-network-advice/), and

¹ <https://www.gov.uk/government/policies/protecting-and-sustainably-using-the-marine-environment/supporting-pages/implementing-the-marine-strategy-framework-directive>

http://www.snh.org.uk/pdfs/publications/commissioned_reports/780.pdf (particularly section 3.5). SNH have also now completed their formal advice to Marine Scotland regarding the review of four MPA search locations, and this can be found at: http://www.snh.org.uk/pdfs/publications/commissioned_reports/780.pdf. Further information on this project can be found at [http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas-\(mpa\)/](http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas-(mpa)/) and <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork>

In November 2014, Marine Scotland reported on a study it had commissioned to investigate ‘Estimates of Collision Risk of Harbour Porpoises and Marine Renewable Energy Devices at Sites of High Tidal-Stream Energy’ (see <http://www.gov.scot/Publications/2014/11/6894>). The study had been commissioned to determine the possibility of marine vertebrates colliding with submerged tidal turbines used to extract energy from fast flowing tidal currents. The aim of the study was to assess how often porpoises occurred in two areas of immediate interest for tidal-stream development on the west coast of Scotland: the tidal narrows of the Sound of Islay (between the islands of Islay and Jura) and the Kyle Rhea (between Skye and the mainland).

Surveys

Scotland

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 in the Sea of Hebrides and Minches in conjunction with basking shark observations (SWF). A line-transect survey of the Minches was undertaken by SWF and RSPB in June 2015. Survey effort amounted to 1,300 km, and yielded 341 sightings of nine marine mammal species.

WDC conducted boat based field surveys off the northeast coast of the Isle of Lewis, in the NE Lewis proposed MPA in 2014. WDC published a paper focusing on Risso’s dolphins in the proposed MPA (Hodgins, *et al.*, 2014). WDC also provided acoustic data to enable the completion of the Masters thesis (Brown, 2014), and published a report on the necessity of Management Options for effective harbour porpoise conservation in the UK (Dolman *et al.*, 2015).

During the reporting period, images were added to photo-ID catalogues for minke whale, killer whale, bottlenose dolphin and Risso’s dolphin (HWDT, SWF & WDC). The populations of bottlenose dolphin and killer whale in West Scotland remain small.

Land-based effort-related watches were maintained by SWF and WDC at a number of sites around Scotland, contributing to the analysis by SWF to identify potential sites for SAC consideration for harbour porpoise and bottlenose dolphin (Evans *et al.*, 2015), and to WDC recommendations on Scottish proposed MPAs in NE Lewis for Risso’s dolphins, and the Southern Trench and Sea of Hebrides for minke whales (and basking sharks).

During summer 2015, harbour porpoise, minke whale, common dolphin, Risso's dolphin, and killer whale were seen regularly in West Scotland, with the first three species seen most frequently. There were several sightings of humpbacks around the Hebrides, and photo-ID confirmed that these involved a number of different individuals (SWF, HWDT, unpublished data). A small pod of long-finned pilot whales entered Loch Ainort Isle of Skye for a period of a few weeks in May-June.

Wales:

Natural Resources Wales (NRW) commissioned SWF for monitoring of bottlenose dolphin in Cardigan Bay and Pen Llŷn a'r Sarnau Special Areas of Conservation in 2014. Using only Capture Mark Recapture techniques, a much reduced abundance survey was completed because of limited funding (Norrman *et al.*, 2015). The project provides information on the distribution, population structure and abundance of dolphins, porpoises and seals in the region. Winter surveys also took place in the Anglesey area of North Wales to which the species disperses seasonally. Additionally, NRW commissioned WDC to conduct vantage-point and, where possible, boat-based surveys of Risso's dolphins off Bardsey Island (North Wales) (report in preparation). SWF continued to conduct boat-based surveys of other cetacean species (harbour porpoise, Risso's dolphin, common dolphin, and minke whale) in Cardigan Bay, Celtic Deep, and around the Isle of Anglesey.

An updated bottlenose dolphin photo-identification catalogue comprising 513 individuals spanning the years 1990 to 2011 was published on behalf of Natural Resources Wales (Feingold & Evans, 2014a, b). The photo-ID studies in Cardigan Bay have found that peak calving occurs between July and September, when 76% of all births are recorded. Females give birth on average every three years (range 2-7 years). Using an open population model, birth rates in 2014 were 4.85% in Cardigan Bay SAC and 4.8% in the entire Cardigan Bay. These compare with long-term averages of 7.5% in Cardigan Bay SAC and 8.5% in the entire Cardigan Bay. Calf mortality rates were calculated from a sample of 71 mother-calf pairs born between 2001 and 2013, and found higher rates in the first two years of life (15% in year one and 17% in year two) than in the third year (7%), with 60% of calves surviving into their fourth year (Norrman *et al.*, 2015).

In Cardigan Bay, West Wales, mark-recapture abundance estimates of the bottlenose dolphin population in the last two years (2013 & 2014) reached lowest values since 2002 (Norrman *et al.*, 2015). The latest estimate coincided with high emigration rates and a high probability of animals staying outside the Cardigan Bay SAC (Norrman *et al.*, 2015). A study around New Quay indicated that behavioural responses to vessels have significantly increased over the past five years, including both vertical and horizontal evasion (Hudson, 2014). Comparisons of residency between individuals in the local population revealed that residents display a degree of habituation to specific vessels, resulting in fewer response behaviours. However, surfacing intervals in the population as a whole decreased in the presence of vessels, with a greater effect on mother and calf pairs (Hudson, 2014). Diurnal and seasonal comparisons found that as vessel activity increased, dolphin sightings decreased, indicating that dolphins were engaging in short-term site avoidance (Hudson, 2014). Further research is required to substantiate these behavioural findings.

Other Masters projects undertaken in Cardigan Bay during 2014 included one on bottlenose dolphin whistle characteristics (Massey, 2014), temporal changes in bottlenose dolphin site usage (Peña, 2014), and skin lesions in bottlenose dolphins (Akritopoulou, 2014).

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. A Masters project on Risso's dolphin distribution and movements was published (Stevens, 2014).

Visual sightings surveys in the Irish Sea continue to be made 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, & Gower Marine Mammal Project). Around the Isle of Man, The Manx Whale & Dolphin Watch (MWDW) continue to actively record 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.

Sightings survey data collected by Sea Watch Foundation over the last twenty years contributed to a study to identify discrete and persistent areas of relatively high harbour porpoise density around the UK with a view to identifying areas for potential SACs for the species (Heinänen & Skov, 2015). An analysis of land watch data from all around the UK between 1990-2014 (funded by JNCC) was undertaken to identify coastal hotspots for harbour porpoise and bottlenose dolphin for consideration as potential SACs (Evans *et al.* 2015). These also revealed both seasonal and long-term trends for the two species at a regional and overall UK scale, with significant increases in harbour porpoise in coastal waters from Northumberland round to South Devon, between 1990 and 2014.

Western England

Around Southwest England, both land watches and vessel surveys (mainly aboard platforms of opportunity such as ferries) continue to be undertaken by Cornwall & Devon Wildlife Trusts, MarineLife, ORCA, and SWF. A new species, bowhead whale, was added to the UK list, with a sighting supported by photos from the Isles of Scilly in February 2015 (Sea Watch Foundation, unpublished data).

Northern Ireland:

The Department of Environment for Northern Ireland held a Marine Conservation Zone Workshop in March 2015 that presented proposed boundaries for Special Areas for Conservation for Harbour Porpoises Stakeholders. NGOs were invited to provide feedback.

A beluga whale was recorded and filmed off the Co. Antrim coast in July 2015 (Sea Watch Foundation, unpublished data).

General:

In 2006, the Joint Cetacean Protocol (JCP) project (see <http://jncc.defra.gov.uk/page-5657>) was initiated. The JCP assembled a number of effort-related cetacean sightings datasets from major sources covering north-west European Atlantic waters e.g. SCANS I & II, CODA surveys, ESAS, SWF, and Atlantic Research Coalition (ARC). It also included data from non-governmental and marine renewable industry sources. Three analyses of the JCP data resource have been completed to date, with the Phase III analysis producing species-specific density layers at the UK scale. The final outputs were modelled density surfaces for seven species averaged over time, with associated uncertainty. The report and associated products from this analysis are due to be published by summer 2015. A meeting of the JCP steering group will be scheduled when a publication date is set for the JCP report package.

Strandings Network

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), and is coordinated by the UK Cetacean Strandings Investigation Programme (CSIP). For information regarding the strandings network, please refer to the UK's national report to ASCOBANS for 2014, and see: (<http://data.ukstrandings.org>). A proportion of data is also made available to the public via a Defra funded portal, the NBN gateway (www.nbn.org.uk/). The CSIP Annual Report to Defra and the Devolved Administrations in the UK, for the period 1st January-31st December 2014 (compiled by R. Deaville, 2015) may be accessed via:

http://randd.defra.gov.uk/Document.aspx?Document=12562_Final_UK_CSIP_Annual_Report_2014.pdf.

The Scottish Marine Animal Strandings Scheme builds on the wider UK Cetacean Strandings Investigation Programme (CSIP), and is supported by Scottish Government. See: <http://www.strandings.org/> and the UK's national report to ASCOBANS for 2014 for more information.

Northern Ireland's Department of the Environment (DoE) Marine Division also record cetacean strandings along the Northern Irish coast. Any stranding records submitted directly to the Irish Whale and Dolphin Group are forwarded to the DoE Marine Division and vice versa.

As detailed in the UK's national report to ASCOBANS for 2014, harbour porpoise and common dolphin remain the most commonly recorded stranded species. In this reporting period, the most commonly identified causes of death for harbour porpoise were bottlenose dolphin attack, starvation, and bycatch. For common dolphin, the most common identified cause of death was live stranding.

Bycatch

A dedicated cetacean bycatch monitoring programme is in place and operated by the Sea Mammal Research Unit (SMRU). Fisheries research laboratories operating fisheries observer programmes in the UK also provide data which are included in our assessment of cetacean bycatch. Whilst the UK observer scheme relies upon good collaborative links with industry, fisheries regulations have been enacted in England and Scotland to ensure that there is also a legal obligation for skippers and owners to

allow observers on board when asked to do so. There is also an obligation under the DCF (in Northern Ireland) for offshore vessels to accommodate scientific observers when requested to do so and an active observer programme is run by AFBI. Additionally, the DARD Inshore Fisheries Work Programme deploys observers to inshore vessels, though there is no “obligation” and this is undertaken by AFBI through good relations with the industry. This programme aims to maintain at least 42 observer days annually who will report cetacean bycatch from the Northern Ireland static gear fishery.

The principal area of concern for cetacean bycatch in the ASCOBANS Extension Area remains the south-western waters of the Western Channel and Celtic Sea. Monitoring remains focused in the SW to reflect bycatch risk, but has also been carried out to a lesser extent in the North and Irish Seas. As sufficient data are compiled, more robust estimates of current bycatch rates will become available.

The latest UK cetacean by-catch report for 2014 as required under EU Regulation 812/2004 continues to indicate that porpoise bycatch rates may have increased slightly in recent years; the reasons for this are not understood. Furthermore, unlike in previous years where estimates were only included for those fisheries where sufficient sampling had been undertaken (leading to bycatch estimates of around 700-800 porpoises per year), in 2013 and in 2014 estimates have been extrapolated to include all UK gillnet fisheries, whether they have been sampled or not, so as to provide an overall estimate for all UK vessels using gillnets in all areas. Estimates produced in this way are higher than those that were restricted to core fisheries and areas, but are also likely to be biased for several reasons. Overall estimates for 2014 were in the region of 1400 to 1700 porpoises. However, due to the number of assumptions made there is significant uncertainty in the estimates and so they should to be treated with caution and considered conservative or absolute maximum values. Work is ongoing to try to refine the estimates by overcoming some of the statistical issues that are evident in the current analysis. The most recent reports on cetacean bycatch in UK waters submitted to the European Commission under the requirements of EC Regulation 812/2004 can be found on the Department for Environment Food and Rural Affairs (Defra) website².

During 2014, investigations on methods to reduce bycatch have been limited to continued monitoring of vessels using acoustic deterrent devices (ADDs), or ‘pingers’. The bass pair trawl fishery, which in the past has been a source of concern with respect to dolphin bycatch, was effectively ended in 2014 and no further monitoring of pinger effectiveness in that fishery has been undertaken. Monitoring of pingers has therefore been restricted to the offshore gillnet fleet that operates from Cornwall to maintain an overview of longer term effects of pingers on cetacean bycatch rates and seal depredation levels in these fisheries.

A number of research projects have been carried out by the Scottish Government, including a recent project concluded at the end of 2013, entitled ‘Evaluating and assessing the relative effectiveness of non-lethal measures, including Acoustic Deterrent Devices (ADDs), on marine mammals’. The aim of this project was to carry out a comprehensive literature and data review on the capabilities of current and

² <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18535>.

developing non-lethal measures for deterring marine mammals. This should help answer questions on design, effectiveness, best practice and impacts of these devices on marine mammals. The final report is now available at: <http://www.gov.scot/Publications/2014/10/8271>. Further details on this and other cetacean bycatch avoidance research undertaken by the Scottish Government can be found at

<http://www.scotland.gov.uk/Topics/marine/marineenvironment/species/19887/20826>.

Contaminants

During 2014, Cefas, in collaboration with the UK Cetacean Strandings Investigation Programme (CSIP), finalised analysis of organophosphate flame retardant (began in 2013) and plasticisers in blubber and liver tissues from 20 harbour porpoises stranded in the UK in 2012. Fourteen of the twenty compounds analysed were below the limits of quantification in all samples. Six could be quantified at maximum concentrations (in blubber) between 6.7 and 246 $\mu\text{g kg}^{-1}$ wet weight, which is up to 50 times lower than historical peaks obtained for PBDEs and HBCD. Although these replacement flame retardants for PBDEs are being found in high levels in abiotic compartments in the environment, such as sediment, air and water, they are readily metabolised and these levels do not suggest a high level of concern regarding potential impacts to marine mammals and do not indicate that routine monitoring in UK porpoises is warranted at this time. A publication has been published in Marine Pollution Bulletin outlining this work (Papachlimitzou *et al.*, 2015).

The study of temporal trends of PCBs in UK harbour porpoises was extended to include animals stranded up to the end of 2013 (now 1990-2013). PCB concentrations have shown no significant decline since 1997 following earlier reductions due to regulation of commercial use. However, Scotland is showing the beginning of a decline, which could become significant with more data. 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 (Jepson *et al.* 2005). The trend data up to 2012 was combined with the data collected in 2013 for bottlenose dolphins and killer whales (under ASCOBANS project reference SSFA2010-3, some from UK plus others from around Europe, see Jepson and Deaville, 2014), and an unpublished data set of PCB results in striped dolphins from the Mediterranean, to produce a paper with PCB results from >1000 animals. The results show that that several European cetacean species have very high mean blubber PCB concentrations likely to cause population declines and suppress population recovery. Further reductions in PCB inputs into the marine environment are undoubtedly needed to mitigate risk from PCB exposure in these species. A manuscript based on these findings has been submitted for publishing in Scientific Reports and is currently out for review (Jepson, P. *et al.* under review).

In addition, PCB analysis was conducted on one historically stranded harbour porpoise from 1999 and 22 common dolphins stranded between 1998 and 2013 to expand a dataset used to investigate the relationship between contaminant burden and reproductive tract disorders being conducted by Sinead Murphy of the Institute of Zoology (see Murphy *et al.*, 2015). Blubber concentrations for most animals were above the threshold for onset of physiological effects in experimental marine mammal studies (Kannan *et al.*, 2000). Also, PCB levels were determined in a pilot whale from the 2012 mass-stranding event in Scotland, which was found to have blubber

concentrations below the threshold for physiological effects. Finally, 20 harbour porpoises stranded in 2012 have been analysed for levels of dioxins and dioxin-like PCBs in their blubber. The data has been generated but has not yet been assessed. The intention is to produce a manuscript for submission to a peer reviewed journal based on this data in the next couple of months. (Losada, S. *et al.*, unpublished).

Marine Noise

In order to meet our obligations under the MSFD for marine noise, the UK has developed a noise registry to capture and store spatial and temporal records of activities generating impulsive sounds in the UK marine environment. This will provide a clear picture of the distribution in space and time of noise generating activities to help the UK to assess whether it is delivering GES.

A JNCC contract on the potential effects of seismic surveys on cetaceans is expected to report this year. The report will analyse data from Marine Mammal Observer reports, submitted as part of the consenting regime for any seismic surveys within the United Kingdom Continental Shelf (UKCS), analysing data from 1994-2010. The work will build on earlier analysis of Marine Mammal Observer reports whilst allowing for longer-term analysis of potential effects of seismic activities on cetaceans, as well as general trends in the implementation of the JNCC seismic guidelines throughout this time period. See the following link: (http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Seismic%20Guidelines_August%202010.pdf).

The Defra funded project entitled “ME5207: The impact of anthropogenic noise on fish and invertebrates at the individual, population, and community level” is awaiting publication. It has resulted in the production of several publications including a comprehensive report entitled “*The impact of anthropogenic noise on UK marine mammals: a review and future suggestions*”.

An additional Defra funded project entitled “ME5222: Partnership-based ambient noise monitoring for the MSFD” commenced in June 2015. This project will undertake an initial UK assessment of ambient (background) noise, and will consider how a UK noise monitoring strategy can be implemented. The first stage of the project will draw on existing ambient noise recordings made around the UK during 2013 and 2014 by Cefas and collaborating agencies. These will form the basis of an initial UK assessment of underwater noise levels, which will provide a baseline for monitoring in subsequent years. Based on this initial assessment, the second stage will consider how an ongoing UK monitoring programme can be implemented through partnership working between Cefas and other marine science agencies and research institutions carrying out field work on underwater noise. A key component of this work will be consulting internationally with regional partners to ensure a coordinated approach to marine noise monitoring. This project will also involve the development of a model to efficiently compute ambient noise levels in UK waters based on AIS shipping densities and environmental parameters.

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b) France

Marine Strategy Framework Directive

Implementation of the Marine Strategy as required under the Marine Strategy Framework Directive in December 2012 is conducted by *Ministère de l'Ecologie, du Développement Durable et de l'Energie* and its operating agency *Agence des Aires Marines Protégées*. *Observatoire PELAGIS*, University of La Rochelle-CNRS, has been identified as the scientific leader (*pilote scientifique thématique*) for all marine mammal issues.

As part of the definition of Good Environmental Status (GES), *Observatoire PELAGIS* contributed to establishing and updating the 2013-2016 work plan for Descriptor 1 (D1) on biodiversity and its relationships with other descriptors, notably D4 on trophic webs. It also contributed to joint working groups on data assessment and aggregation. Further information on the development of MSFD in France can be found at Government websites (<http://www.dirm.nord-atlantique-manche-ouest.developpement-durable.gouv.fr/> and <http://www.dirm.sud-atlantique.developpement-durable.gouv.fr/>).

The monitoring plan includes a monitoring programme for marine mammals and turtles that consists of five sub-programmes, namely 1) coastal populations of cetaceans, 2) coastal population of seals, 3) marine mammals and turtles at sea, 4) marine mammals and turtles stranding schemes, and 5) interaction of marine mammals and turtles with human activities.

An update of the initial assessment as well as a proposal for monitoring actions were completed recently on the micro-nektonic compartment that constitutes a key element as forage organisms for oceanic and slope dwelling cetaceans (Spitz, 2014).

Besides its contribution to the government-led implementation of MSFD in France, *Observatoire PELAGIS* has also been working on the development of several indicators on the basis of existing data sets.

The problem of a common scale is particularly acute for schemes such as the MSFD, which explicitly requires inter-comparability among and between broad marine regions, and hence between different countries bordering a large marine ecosystem (MSFD preamble 25). This requirement raises questions about minimum data requirements and the appropriate scale of a biodiversity indicator. Ideally, indicators should 1) account for imperfect detection, 2) account for spatio-temporal variability, 3) have a common scale across species, 4) have a common scale across ecosystems, 5) be interpretable and ecologically relevant, 6) be reported with a measure of its uncertainty, 7) be specific and sensitive to pressures, and 8) be easily communicable to stakeholders.

Obviously, all these considerations cannot be fulfilled simultaneously, and trade-offs have to be found. It is aimed at proposing an indicator that would fulfill the first six considerations, and to a lesser extent the eighth one. To design this indicator, occurrence (0/1) data on several species collected over large marine areas at regular time intervals (typically every year) were used in the framework provided by Spatial Rasch Models. Cetacean data came from systematic megafauna surveys conducted onboard *IFREMER* R/V *Thalassa* from 2004-present and allowed habitat suitability and cell reliability to be estimated from the spatial Rasch model. Final reporting on this work is expected in 2016.

Another effort in developing indicators dealt with the issue of mapping and estimating total cetacean bycatch in fishing gears. A particularly well-identified challenge in estimating cetacean bycatch in European waters is that current monitoring programmes that are conducted nationally on a selection of fisheries have so far failed to provide a credible estimate of biological removal at the population scale. An analysis of stranding data sets from the Atlantic and western Channel seabords of France and the UK, and taking into account the probability that a cetacean carcass would float, its drift under wind and tide effects, and the probability that a stranded animal would be reported (Authier *et al.*, 2014; Peltier & Ridoux 2015), allowed the spatial distribution of common dolphin mortality in fisheries to be mapped from 1990-2009, as well as total numbers to be estimated, with associated uncertainty. This analysis suggests that total removal of common dolphins by all fisheries operating in the study area was consistently about one order of magnitude higher than removals reported from dedicated on-board observer programmes conducted under EU regulation 812/2004. The areas of highest mortality pressure spread across the southern half of the Bay of Biscay, notably along its continental shelf break, and to a lesser extent in the Celtic Sea and western Channel, off Cornwall. Final reporting on this work is expected in 2016.

Marine Protected Areas

The *Parc Naturel Marin de l'Estuaire de la Gironde et des Pertuis Charentais* was officially created in April 2015 by MEDDE and AAMP (<http://www.aires-marines.fr/L-Agence/Organisation/Parcs-naturels-marins/Parc-naturel-marin-de-l-estuaire-de-la-Gironde-et-de-la-mer-des-Pertuis>). It spreads across 6500 square kilometres from Bordeaux to north of La Rochelle, including the whole Gironde Estuary and waters around Oléron and Ré Islands. It includes dense and diversified human activities among which shellfish farms, fisheries, tourism and shipping are the most significant. Although it is not home for any resident cetacean population, the marine park is visited by bottlenose and common dolphins year round, by harbour

porpoise in winter, and by long-finned pilot whales in the summer. It is considered that it would ultimately contribute to overall cetacean conservation in the Bay of Biscay as part of a network of MPAs that are already in place or considered for designation in the future (see below).

MEDDE, AMMP and MNHN (*Muséum National d'Histoire Naturelle*) together with *Observatoire PELAGIS* work on the designation of new Natura 2000 sites to be transmitted to the European Commission later in 2015, notably on the basis of new information collected under the PACOMM project (*Programme d'Acquisition de Connaissance sur les Oiseaux et Mammifères Marins*). The designation process is led by MEDDE, with scientific support from MNHN to identify large areas of interest for seabirds and marine mammals, technical support from AAMP, and public consultation with all stakeholders organised by the Maritime Prefectures for the Atlantic and Channel seaboard (http://www.developpement-durable.gouv.fr/IMG/pdf/ppt_processus_designation_sites_N2000_large-3.pdf).

In this context, the interpretation of distribution data collected by *Observatoire PELAGIS* (see below under surveys) and analysed by using the conservation planning software MARXAN led to the identification of seven large areas of interest to the conservation of seabirds and cetaceans in the Bay of Biscay and the western Channel (Delavenne *et al.*, 2014; Figure 2).

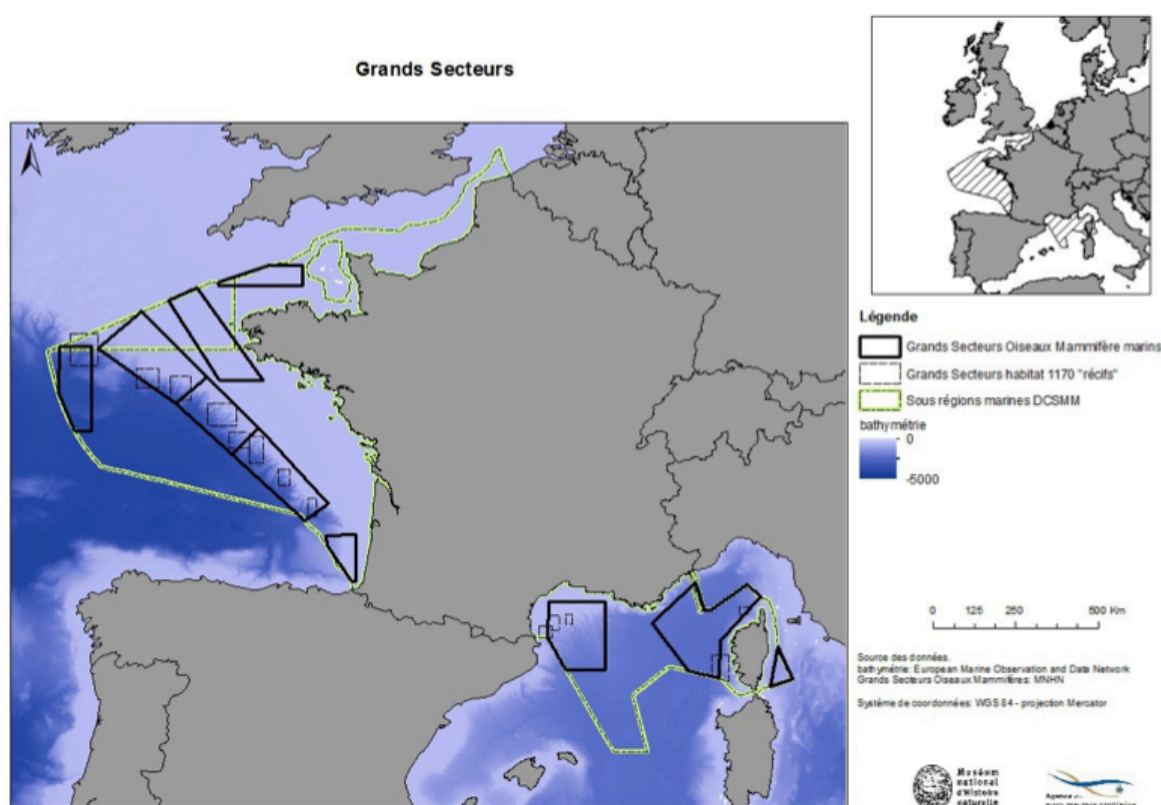


Fig. 2. Map showing the areas of interest for seabirds and marine mammals in France's EEZ (*Grands secteurs*; shown as polygons in bold lines) that are open to consultation for designing new offshore Natura 2000 sites off the Atlantic seaboard (http://www.developpement-durable.gouv.fr/IMG/pdf/carte_GS_mm-oiseaux_et_recifs_France.pdf).

Parallel to this approach, *Observatoire PELAGIS* and *Centre d'Etudes Biologiques de Chizé* (CEBC) attempted to assess the network of existing and proposed Natura 2000 sites and offshore new marine protected areas (MPAs) in order to inform the negotiation process involved in the designation of these new offshore MPAs. The extensive data set produced by the SAMM project (see below under *Surveys*) was used to build habitat models, by using a combination of physiographic and oceanographic variables in a GAM analysis. For each MPA and for the whole network of MPAs (existing or submitted for discussion), a ratio between species relative abundance predicted within MPA boundaries and the total relative abundance predicted across the whole French EEZ was computed. Results showed that the existing network, that is mostly coastal, was insufficient for cetaceans, since only 27% of harbour porpoise populations lived within the network of MPAs in winter, 25% of bottlenose dolphin populations in summer, and much lower values for all other species and seasons, to a mere 1% of the common dolphin population in summer. The proposed large offshore MPA would be of great interest, especially for pelagic species, since all species studied showed population fractions included in the network varying from 28 to 58% depending on species and seasons. A preliminary report of this work is available in Pettex *et al.* (2014).

Surveys

Population monitoring is based on photo-identification surveys for small resident populations, on dedicated multi-target aerial surveys for pelagic and wide ranging populations, and on boat based surveys using research vessels engaged in fish stock assessment to investigate relationships with prey fields.

The large bottlenose dolphin community of the Gulf of Saint Malo is monitored by *Groupe d'Etude des Cétacés du Cotentin* (GECC). The social structure and abundance of this community were assessed using photo-identification techniques (Louis *et al.*, 2015). Like other bottlenose dolphin communities worldwide, this resident community has a fission–fusion social structure, with fluid associations among individuals (half-weight index = 0.10). Association patterns were highly variable as indicated by a high social differentiation ($S = 0.95 \pm 0.03$). The majority of associations were casual, lasting days to months. However, individuals exhibited also a smaller proportion of long-term relationships. A mean group size of 26 was large compared with other resident coastal communities, and variable, ranging from 1 to 100, which could be the results of ecological conditions, in particular resource predictability and availability. Analyses also showed that the community was organised in three social clusters that were not completely isolated from each other. Abundance was estimated at 420 dolphins (95% confidence interval: 331–521), making this coastal community one of the largest identified along European coastlines. Because human activities in the Gulf are expected to increase in the upcoming years, long-term demographic monitoring of this dolphin community will be critical for its management.

Similarly to the previous example, resident coastal populations of bottlenose dolphins are also monitored by using photo-identification combined with Capture-Mark-Recapture analyses around Sein and Molène Islands by *Parc Naturel Marin d'Iroise* (PNMI). An analysis of the PNMI dataset and methodological recommendations are being prepared by *Observatoire PELAGIS* (report due later in 2015). This approach is going to be strengthened in the future by the implementation of the MSFD monitoring

plan, as it constitutes sub-programme 1 of the marine mammals and marine turtles monitoring programme.

The extended SAMM (*Suivi Aérien de la Mégafaune Marine*) conducted in the winter of 2011-2012 and the summer of 2012, was followed up by a geographically limited replica in the winter of 2014 focusing on the eastern Channel (SAMM-ME), an area of heavy human activity, including fast development of wind farms.

The general objectives of the SAMM winter and summer multi-target (mainly seabirds and cetaceans) surveys were to inform the Natura 2000 existing site assessment and new offshore site designation processes. Specific questions relative to cetaceans were to describe seasonal variation in relative abundance, distribution and habitat of cetaceans across the French EEZ in order to assess existing MPAs and identify areas of interest for designing new offshore MPAs (Pettex *et al.*, 2014).

In the extended area of the agreement, all species groups, except the long-finned pilot whale and the Risso's dolphin, clearly associated with the shelf break, showed marked seasonal variation in distribution, density and habitat. This was particularly true for the harbour porpoise. The species had its main year-round hotspot in the Dover Strait area, but was found in a narrow coastal band extending southward to the Basque Country in winter, whereas the summer distribution extended across the western Channel and Celtic Sea westward to the shelf break. For small delphinids (here, common and striped dolphins), the distribution was preferentially on the shelf of the Bay of Biscay and western Channel in winter, and over the slope and in oceanic waters in the summer. Summer densities in the Bay of Biscay were twice as high as in winter, whereas in the western Channel they were ten times higher in winter than in summer, suggesting extensive redistribution between seasons. The bottlenose dolphin was more abundant in winter than in the summer, and clearly associated with offshore habitats, including the deeper margin of the shelf, the slope and oceanic waters. Known resident populations of the Gulf of Saint Malo, and west of Brittany were barely visible in the results, illustrating the fact that the pelagic ecotype is likely one order of magnitude more abundant than the coastal ecotype. Fin and minke whales would clearly segregate in the NE Atlantic, with the former in oceanic waters of the Bay of Biscay and the latter in shelf habitats of the Bay of Biscay, western Channel, and southern Celtic Sea.

The existing network of Natura 2000 sites and other MPAs is home to only 4 to 21 % of the bottlenose dolphin and harbour porpoise populations according to seasons, and still lower shares for the other species. Large areas of interest to the conservation of seabirds and cetaceans, were identified by using the MARXAN software (Delavenne *et al.*, 2014). These areas, which are now submitted for discussion and negotiation in the process for the designation of new offshore Natura 2000 sites, would provide a major improvement in the proportion of protected cetacean habitat if they were integrally included in the network.

The SAMM-ME survey (Ricart *et al.*, 2014) aimed at documenting the abundance and distribution of marine megafauna in the eastern Channel, in order to strengthen previous data collected during the SAMM survey, and therefore inform managers in charge of the rapid development of three major wind farms (from west to east: Courseulles sur mer, Fécamp, and Tréport). The harbour porpoise was by far the most

abundant cetacean species throughout the area; a few common and bottlenose dolphins were sighted in the western part of the study area as well as some white-beaked dolphins to the east. Only harbour porpoise data were sufficient to allow habitat analysis showing the importance of the Dover Strait, and to a lesser extent, coastal areas off Normandy (including the Fécamp wind farm site) and south west of the Isle of Wight.

Observatoire PELAGIS runs annual marine megafauna (mainly cetaceans and seabirds) surveys from recurrent fish stock surveys conducted by IFREMER in the Bay of Biscay and the Channel. These surveys started in 2003 (PELGAS, May, Bay of Biscay shelf waters, small pelagic fish), 2007 (EVHOE, November, Bay of Biscay shelf waters, bottom dwelling fish), 2010 (IBTS, January, Channel and southern North Sea, small pelagic fish), and 2014 (CAMANOC, September, western Channel, small pelagic fish), and have been consistently maintained so far. They allow investigation of the year-to-year variability in cetacean and seabird distributions, densities and preferred habitats (Authier *et al.*, 2014), and on the relationship with potential forage fish and collected environmental parameters measured *in situ* and simultaneously to the sightings.

In the future, periodic aerial surveys similar to the SAMM survey and annual vessel based surveys similar to the PELGAS survey should be an integral part of the MSFD monitoring plan under sub-programme 3 of the monitoring programme for marine mammals and turtles.

The Marsac Program has been conducted as a baseline to determine the feasibility of use of Static Acoustic Monitoring to monitor the harbour porpoise and other small odontocetes (small delphinids and bottlenose dolphins) along the Atlantic French coasts through two small scale acoustic observatories. Eight click detectors (C-PODs) were deployed in waters 16-55 m deep over a one-year period (from July 2012 to March 2014, depending upon the deployment site). In a well-contrasted environment, five different mooring set-ups and their deployment and recovery procedures were tested. C-PODs were moored during almost 2206 days and acoustically monitored for the presence of cetaceans for 1488 days, which means 67% of the recording effort. Heavy structures on the bottom without surface buoy and mooring line with acoustic release were the most effective design and are highly recommended for future SAM study in coastal waters. The acoustic data collected by C-PODs have allowed one to assess seasonal patterns of distribution of harbour porpoises and other small odontocetes (small delphinids and bottlenose dolphins) in the Marine Protected Area in Iroise Sea (West Brittany) and in the coastal waters in front of Arcachon Bay. The study confirmed a regular use of the Iroise Sea and waters offshore the Arcachon Bay by harbour porpoises and other cetaceans with seasonal pattern of occurrence consistent with previous visual surveys. Presence of porpoises and dolphins around the deployment sites was also influenced by the light regime, and certain deployment sites were clearly important for foraging activity of species. In protected areas where there are limited funds to provide the legal monitoring requirements, this study underscores the advantages of passive acoustic monitoring over visual surveys for monitoring echolocating cetaceans during all weather conditions with minimal staff requirements and relatively inexpensive setup costs.

Ferry observer surveys between Roscoff and Cork, Portsmouth and Santander (Orca/Oceanopolis Brest/), using a standardised protocol.

Dietary Studies

Functional approaches in cetacean foraging ecology have been developed to go beyond a traditional taxonomic framework in dietary studies, and to improve our knowledge of ecosystem functioning, notably in the perspective of cetacean conservation and management. The relevance of a three-matrix approach in foraging ecology among a marine mammal community in the north-east Atlantic has been tested to identify the key functional traits shaping prey selection processes regardless of the taxonomy of both the predators and prey. The study reveals that prey found in the diet of marine mammals possess functional traits, which are directly and significantly linked to predator characteristics, allowing the establishment of a functional typology of marine mammal-prey relationships. Prey selection of marine mammals was primarily shaped by physiological traits and then by morphological traits of both predators and prey, confirming that energetic costs of foraging strategies and muscular performance are major drivers of prey selection in marine mammals. Trait-based approaches proposed a new definition of cetacean needs which should provide an appealing framework to anticipate bottom-up effects on cetacean population dynamics in identifying the sensitivity of predators to the loss of prey key functional traits associated with shift in prey availability (Spitz *et al.*, 2014).

Strandings Network

The French stranding scheme exists for all French metropolitan and overseas territories' coastlines since the 1970s and is considered to be consistent in its organisation and reporting capability since 1990 (Authier *et al.*, 2014).

Basic information regarding the stranding network is reported yearly (see, <http://www.observatoire-pelagis.cnrs.fr/publications/rapports/bilan-des-echouages-1992-2013/article/bilan-des-echouages-1992-2013-184>). The most recent issue of the series refers to stranding data for the year 2013 (Van Canneyt *et al.*, 2014).

Stranding data are collected by a network of about 350 trained field correspondents coordinated by *Observatoire PELAGIS* and organised in four sub-units: Channel, Bay of Biscay, Mediterranean, and overseas territories. Only the Bay of Biscay relates to the Extension Area of the Agreement.

In 2013, a total of 1,455 marine mammal strandings were reported, which is the highest number ever recorded since the beginning of the stranding response scheme, including 856 cetaceans reported from the Atlantic seaboard. Salient points include a major unusual stranding event of common dolphins, and the continued high values of stranded harbour porpoise. A new unusual stranding event of common dolphins was documented along the Bay of Biscay in January-February, with a high proportion of animals showing marks of by-catch. The spectacular increase of harbour porpoise strandings, which started in the mid 1990s, continued at a very high pace in the Channel with a new maximum value of 333 individuals, nearly twice the previous maximum value recorded in 2012, and apparently halted in the Bay of Biscay with 164 individuals in 2013 compared with 155 in 2012. Stranding data seemingly reveal the continued distribution shift of the species in the NE Atlantic (Peltier *et al.*, 2013). Man-induced mortality, mainly bycatch, was diagnosed for 45% of the 180

necropsied carcasses, while 29% died of apparently natural causes, and the rest died of unknown causes.

This stranding response scheme is the main component of the MSFD monitoring plan sub-programmes 4 and partly 5 (see above under *MSFD*) and should be strengthened in the future, notably to improve consistency of the analytical work aimed at better documenting cetacean health status and main causes of mortality.

Bycatch

A dedicated cetacean bycatch monitoring programme is in place, operated by IFREMER and reported yearly.

An integrative analysis and review of marine mammal bycatch data in set net fisheries over the years 2008 to 2013 was conducted recently (Morizur *et al.*, 2014). All the observations were done on nets without pingers, and they were pooled to provide an average bycatch rate of marine mammals by fleet. Estimates of annual bycatch were calculated for each fleet by using the fishing efforts of the year 2012. Harbour porpoise was the most common bycatch in set nets. An average annual removal of 600 harbour porpoises was estimated from set net fisheries operating in the Bay of Biscay and the Channel; other species recorded in set nets were mainly common and striped dolphins as well as grey and harbour seals. As much as 80% of porpoise bycatch occurred in the monkfish and sole trammel net fisheries. Gill nets in area VIII were responsible for the remaining 20%. Most harbour porpoise bycatch occurred in the 80-110 metres depth range. Some level of spatio-temporal variation in bycatch rates was found; highest rates were found in the Bay of Biscay in winter, and in the Channel and Celtic Sea in the summer, consistent with the species seasonal change in distribution. Bycatch rates of harbour porpoise did not differ between trammel nets and gill nets.

Besides the on-board observer programme conducted by IFREMER in fulfilment of regulation 812/2004, Observatoire PELAGIS attempted to derive estimates of total common dolphin bycatch from an analysis of the subset of the French and UK stranding data composed of all individuals showing bycatch marks. This analysis suggests that total bycatch for this species in the Bay of Biscay, southern Celtic Sea and western Channel, would be about ten times higher than reported by observer programmes conducted under regulation 812/2004 in the same area (see more under *MSFD*). The difference between the two approaches would mostly result from the observer programmes being focused on a limited number of fisheries, and the stranding response schemes receiving bycaught animals from all fisheries with no distinction. It is proposed that this kind of analysis would usefully complement observer programmes by providing a broader view of the phenomenon.

Population structure

Research on stock structure in the extended area of the agreement has mainly been concentrated on the bottlenose dolphin and the development of RAD tag sequencing in cetacean studies.

In the North-West Atlantic, two distinct bottlenose dolphin ecotypes (i.e. ‘coastal’ and ‘pelagic’) have been identified. The genetic population structure of North-East Atlantic (NEA) bottlenose dolphins was investigated on a large scale through the

analysis of 381 biopsy-sampled or stranded animals using 25 microsatellites and a 682-bp portion of the mitochondrial control region (Louis *et al.*, 2014a). Coastal and pelagic bottlenose dolphins were highly differentiated in the NEA, and finer-scale population structure was found within the two groups. As coastal environments are under increasing anthropogenic pressures, small and isolated populations might be at risk and require appropriate conservation policies to preserve their habitats.

Forces shaping population structure and ecotype differentiation ('pelagic' and 'coastal') of bottlenose dolphins in the North-east Atlantic were investigated using complementary evolutionary and ecological approaches (Louis *et al.*, 2014b). Inference of population demographic history using approximate Bayesian computation indicated that coastal populations were likely founded by the Atlantic pelagic population after the Last Glacial Maxima, probably as a result of newly available coastal ecological niches. Genetic differentiation between coastal and pelagic ecotypes may be maintained by niche specialisations, as indicated by stable isotope and stomach content analyses, and social behaviour. The two ecotypes were only weakly morphologically segregated in contrast to other parts of the World's Oceans. This may be linked to weak contrasts between coastal and pelagic habitats and/or a relatively recent divergence.

Restriction-site-associated DNA tag (RAD-tag) sequencing has become a popular approach to generate thousands of SNPs (single nucleotide polymorphism) used to address diverse questions in population genomics. The University of La Rochelle evaluated the applicability of this approach to conduct genome-wide scans for polymorphisms across two cetacean species belonging to distinct families: the short-beaked common dolphin and the harbour porpoise (Viricel *et al.*, 2013). This is one of the first empirical investigations using RAD-tag sequencing at this level of divergence, and highlights the great potential of this approach in comparative studies and to address evolutionary questions.

A genetic study on the harbour porpoise (collaboration between the University of Brest and Oceanopolis Brest) was presented successfully at the end of September 2014 for a PhD (student involved: E. Alfonsi). The analyses are ongoing, with samples from the North Sea.

Contaminants

Paula Méndez Fernandez' PhD work was aimed at 1) determining the degree of ecological segregation between five sympatric species of odontocetes, the common dolphin, harbour porpoise, bottlenose dolphin, striped dolphin and long finned pilot whale, inhabiting highly productive waters of the North West Iberian Peninsula (NWIP); and 2) evaluating the contamination status of these species in order to estimate the toxicological risk these populations are facing. In this context, trace elements, carbon and nitrogen stable isotopes, as well as persistent organic pollutants (POPs), were analysed.

Firstly, it was estimated that the food web off the NW Iberian Peninsula had five trophic levels, with toothed whales at the top; no significant difference in trophic positions was found among the five species, with values ranging from 4.3 to 5.3. While the analysis of a single chemical parameter did not allow to completely differentiate the five species, information gained by combining several long-term

ecological tracers revealed ecological niche segregation along the dietary and spatial dimensions of their trophic niche. Additionally, it was shown that polychlorinated biphenyl (PCBs) profiles could be a relevant tracer of foraging ecology. This was particularly clear for the harbour porpoise and striped dolphin.

Secondly, the contamination status of the species in this area was evaluated, with concentrations interpreted in the light of biological and ecological factors. Bioaccumulation of trace elements appeared to be less predictable than that of POPs. Bottlenose dolphins and harbour porpoises were found to have higher PCB concentrations than the other small cetaceans studied around the NW Iberian Peninsula (this work), as well as those of adjacent NE Atlantic waters.

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c) Ireland

Cetacean Protection Strategy and Conservation Plan

Ireland’s National Cetacean Protection Strategy focuses on (1) designating and monitoring SACs, (2) ensuring that regulatory and administrative functions are sufficiently rigorous, and (3) pursuing an integrated strategy for the surveillance (i.e., monitoring) of cetaceans. Progress in 2014-15 under each of these strategic pillars is outlined below. In addition, remaining actions identified in the *Conservation Plan for Cetaceans in Irish Waters* (DEHLG, 2009), which underpins the Protection Strategy, have been progressed further in the 2014-15 period. Several actions such as species’ surveillance, research or bycatch monitoring, for example, are long-term in nature (i.e., extend beyond the lifetime of the Plan) and thus represent ongoing work for the relevant statutory authorities and partner organisations. Continued emphasis in the 2014-15 period has been given to the process, scientific rigour and consistency by which fisheries, aquaculture and other industrial activity (e.g., petroleum exploration, marine construction) are assessed with regard to their risk of impact on cetaceans whether within designated sites or more broadly in the waters of Ireland’s EEZ.

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 (DAHG) via <http://www.npws.ie/marine/marinemammals/cetaceans/>. A further update to the Delivery Schedule was completed in May 2015.

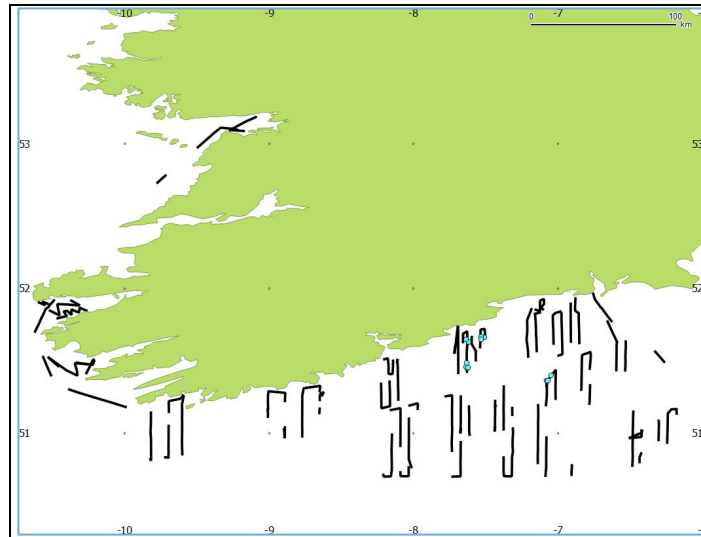
Regulatory and administrative function

In progressing the necessary regulatory and administrative actions under the Conservation Plan, Ireland's Department of Arts, Heritage and the Gaeltacht has disseminated widely its 2014 guidance in relation to anthropogenic noise where protected marine mammals are concerned and the specific marine activities which in its view should be subject to rigorous risk assessment (DAHG, 2014; see <http://www.npws.ie/marine/bestpracticeguidelines/>). In general the risk assessment and risk management approaches outlined in the guidance have been adopted widely by Industry and other stakeholders and they are now commonly incorporated in a wide range of applications for marine or coastal licences/consents.

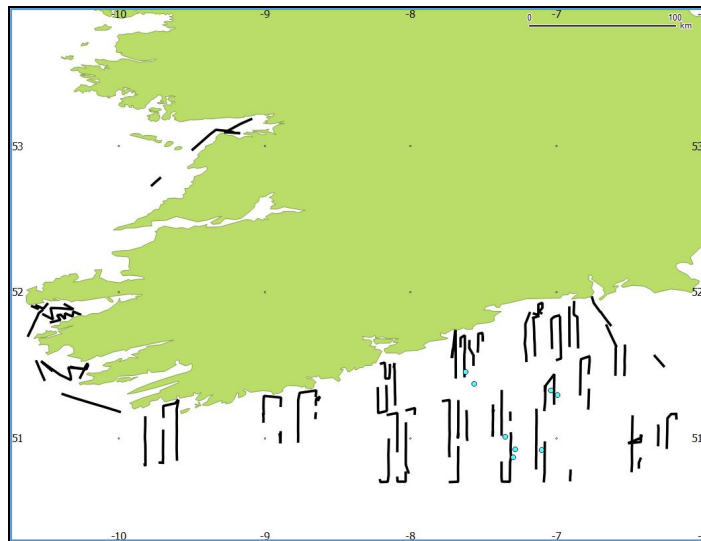
Successive independent observer programmes aboard pelagic fishing vessels to meet compliance with European Council Regulation 812 (2004) continued to operate during 2010, 2011 and 2012. During this sampling period no cetacean bycatch was observed in any of the independent observer trips undertaken aboard pelagic fishing vessels. However, evidence from a notable stranding event of short-beaked common dolphins on the west coast of Ireland in early 2013 (Deaville *et al.*, 2013) and from certain set-net fisheries (Cosgrove *et al.*, 2013) indicated that cetacean bycatches can and do occur in Irish waters. A number of bycatch monitoring initiatives are continuing, led by the Department of Agriculture, Food and the Marine, An Bord Iascaigh Mhara (The Irish Sea Fisheries Board), and the Marine Institute, including continued regional sampling of set-net fisheries and standardised recording efforts under the Data Collection Framework and revised Common Fisheries Policy.

Monitoring of conservation sites designated for *Annex II* species under the EU Habitats Directive

Details concerning all sites designated as candidate Special Areas of Conservation (SAC) for harbour porpoise and bottlenose dolphin can be obtained via <http://www.npws.ie/protectedsites/>. As part of the suite of cetacean surveillance initiatives underpinned by the National Cetacean Protection Strategy, three such sites have been the subject of targeted site-based monitoring in the last year. The Blasket Islands SAC for harbour porpoise was subject to six repeated summer line-transect surveys in 2014 (O'Brien and Berrow, 2014), while the Lower River Shannon SAC (Co. Clare, Co. Kerry) for bottlenose dolphin and Roaringwater Bay and Islands SAC (Co. Cork) for harbour porpoise are currently being surveyed in the summer of 2015. Based on randomised transect designs appropriate to each site, combined visual and acoustic surveys have successfully produced individual-survey and pooled-survey summer density estimates for porpoises within each study area. The photo-ID mark-recapture approach being implemented in the Lower River Shannon SAC will provide updated summer estimates of abundance for the resident bottlenose dolphin population inhabiting the Shannon Estuary.



3a



3b

Figures 3a, b. Maps of visual survey effort (black survey track line) and the sighting locations (blue circles) of Fin whales (1a) and Humpback whales (1b) recorded during the Celtic Sea Herring Acoustic Survey in October 2014 (Cronin & Barton, 2015)

In addition to the above site-based monitoring, ongoing PhD studies based at University College Cork and the Galway-Mayo Institute of Technology have been investigating bottlenose dolphin population size, structure, habitat use and ecology along the west and north-west coasts of Ireland (including the new West Connacht Coast SAC) and in the Shannon Estuary, respectively. Key objectives of these projects are to investigate in detail the dolphin communities inhabiting each region, to describe the community and social structure, and to better understand habitat use within each regional study area.

EEZ surveillance in accordance with existing Directives

Ireland has completed a process of reviewing and harmonising its surveillance programmes for the Irish Exclusive Economic Zone (EEZ) beyond its designated SAC sites, particularly with respect to (a) ongoing and future pressures on *Annex IV* cetacean populations (e.g., via commercial fisheries or other industrial activities), (b) obligations under the Habitats Directive (HD) and the Marine Strategy Framework

Directive (MSFD), and (c) the potential for transnational collaboration and more integrated species reporting in future years. As part of its cetacean surveillance regime for the 2013-2018 HD reporting cycle, offshore ship-based surveys contracted by DAHG continued into late 2014 with line-transect coverage of the northern Celtic Sea (Figures 1a, 1b; Cronin & Barton, 2015). Further targeted observer coverage is planned on an ongoing basis within the current 6-year cycle.

There remains a requirement for improved knowledge with respect to *Annex IV* protected species occurrence (both spatial and temporal), habitat and population ecology in the EEZ to inform and underpin appropriate management and regulatory actions while also facilitating significant industrial practices wherever possible. In late 2014 Ireland's Minister of State with responsibility for petroleum affairs approved funding of just over €2.5 million for a Government-led research initiative entitled the ObSERVE Programme (see <http://www.dcenr.gov.ie/natural-resources/en-ie/Oil-Gas-Exploration-Production/Pages/ObSERVE-Programme.aspx>). This significant investment is being augmented by funding and technical support from the Department of Arts, Heritage and the Gaeltacht that will jointly culminate in the acquisition of high quality scientific data and a large part of Ireland's EEZ (Figs. 3, 4) being surveyed intensively over the next 3 years.

Planning and development of the ObSERVE Programme was undertaken by the Department of Communication, Energy and Natural Resources (DCENR) and the National Parks and Wildlife Service to meet shared scientific and management objectives. The Programme will be operated as a collaboration between both Government Departments. Two ObSERVE projects (one aerial, one acoustic) are now under way, operating from summer 2015 to early 2018. The core scientific objectives of these three-year projects are:

1. to update contemporary ecological information on the Irish EEZ and Atlantic Margin via extensive new survey effort and also the consideration of previous survey results,
2. to assess at the broad scale the importance of waters within the offshore study area for a wide range of marine mammal and seabird species,
3. to identify, where possible, sub-areas that indicate a higher ecological importance for cetaceans and/or seabirds.

The ObSERVE Acoustic project (www.observe-acoustic.ie) involves *inter alia* the deep ocean deployment of autonomous acoustic devices (AMAR and Deep C-POD units) around offshore canyon and slope areas within four prescribed zones of interest along Ireland's continental margin (Fig. 4). A total of eight such listening stations will be operational from May-October 2015 and April-October 2016; four such stations are currently in place across zones 1 and 2. In addition, three regional towed acoustic surveys are being undertaken each year during the spring-autumn study period. Each data acquisition phase will be followed by detailed data analysis, species abundance/density estimation (where possible) and spatial investigation of the data. Following procurement in early 2015, researchers from Galway-Mayo Institute of Technology are leading an international team on this project (additional partners: Marine Institute, Jasco Applied Sciences, SMRU Consulting, and Irish Whale and Dolphin Group).

The ObSERVE Aerial project (www.observe-aerial.ie) involves rigorous and extensive aerial surveys of waters in the Atlantic Ocean, Celtic Sea and Irish Sea using experienced visual observers and a prescribed line-transect design (Fig. 5). The aerial survey method being used for cetacean detection and recording is that adopted in the SCANS-II project (SCANS-II, 2008; Hammond *et al.*, 2013); a complementary strip-transect method for seabirds is also being employed. A total of four replicate surveys (i.e., 2 summer and 2 winter coverages) will record the seasonal occurrence, location and abundance/density of cetaceans and seabirds within five regional strata (Fig. 3). Each data acquisition phase will be followed by detailed data analysis, species abundance/density estimation (where possible) and model-based investigation of the data. Following procurement in early 2015, researchers from University College Cork are leading an international team on this project (additional partners: Aerosotravia, IMARES, and ALNILAM).

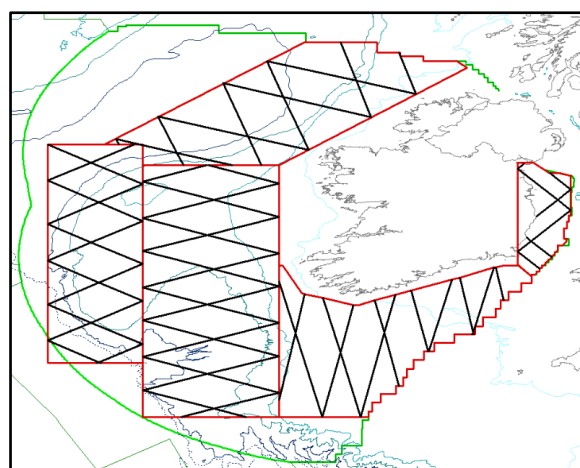
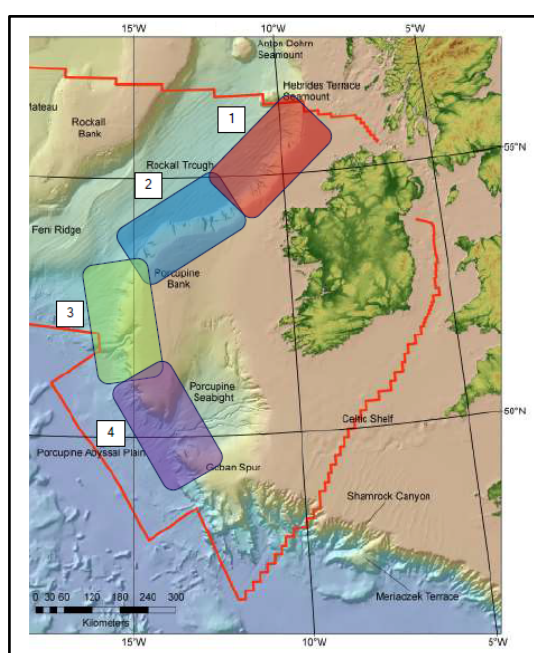


Figure 4. ObSERVE Acoustic zones along the shelf margin. **Figure 5.** ObSERVE Aerial survey design (black lines) within Ireland's EEZ.

Ireland is also participating in ongoing discussions with national & international research and regulatory partners concerning *inter alia* large-scale or regional survey initiatives within the current and future Habitats Directive reporting cycles and in consideration of MSFD requirements; these initiatives include the proposed SCANS-III survey provisionally scheduled for the summer of 2016.

The Irish Whale and Dolphin Group (IWDG) Stranding Scheme for cetaceans continues in 2015 with contributory funding from the Irish Government. Under the scheme, stranding records are received from IWDG members, NPWS Conservation Rangers and members of the public, usually by email or phone. All records continue to be validated by the IWDG and are periodically published in the Irish Naturalists' Journal (e.g., O'Connell and Berrow, 2011). Stranding reports in Ireland totalled 92, 157, 161, 193 and 179 events during 2010, 2011, 2012, 2013 and 2014 respectively.

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d) Spain

New estimates on population abundance

Marcos-Ipiña *et al.* (2014) provided a new estimate for bottlenose dolphins (*Tursiops truncatus*) in the Basque country using photo-identification data obtained from over an eight-year period (2003-2010). This estimate is 3,972 individuals (95% CI: 2730-5888, CV: 19.9%). There was significant interannual and seasonal variation in the relative abundance of the species in the area.

Vázquez *et al.* (2014) provided relative estimates of abundance of fin whales using the sightings obtained by an observer placed on the vessels providing support to the fishing boats following the anchovy migration. These estimates were calculated for a single year, 2007, and for the period of three years the programme was running - 2007-2010. The estimates are: 2007= 4964 individuals, 95% CI: 4532-5890, CV: 0.20%, and 2007-10=9109 individuals, 95% CI: 8571-10070, CV: 0.05, respectively.

Saavedra *et al.* (2015a) used the sightings data collected annually by a team of observers on board the spring acoustic survey that prospected the N and NW Spanish shelf waters to obtain a common dolphin density estimate for the area, of 0.132 dolphins/km² using Distance software. This estimate was calculated using a detection function corrected for attraction and also using Bayesian methods incorporating previous data on attraction collected during SCANS-II with data collected from the acoustic fish surveys.

Threats

Covelo *et al.* (2014) compiled the available information on Rissos' dolphin in Galicia using the stranding records and coastal observations. The authors noted that there is a decreasing tendency in the number of strandings over the time series (1990-2013) and in the number of sightings (2003-2007) and, that strandings and sightings show a seasonal pattern, both being more abundant in November-March. Sightings indicate group sizes of 2-25 individuals and on only three occasions, presence of calves was noted. The authors noted that almost half of the stranded individuals showed evidence of bycatch and that this, together with the decreasing number of sightings and strandings, was a cause for concern.

López *et al.* (2014) reported the circumstances surrounding a mass stranding of 22 short-finned pilot whales in the north of Galicia (NW Spain) on the 7th of October 2013. Examination of the bodies did not shed any light into the cause of the stranding.

Saavedra *et al.* (2014a) analysed the spatial and temporal patterns in the stranding series in Galicia (NW Spain) for the three best-represented cetacean species in the stranding records (common dolphin, bottlenose dolphin and harbour porpoise). Results indicated a significant effect of oceanographic indices (e.g. NAO and NAO winter) on the number of strandings in all species (with the exception of NAO winter for bottlenose dolphins).

Saavedra *et al.* (2014b) developed population models for common dolphins (*Delphinus delphis*), using mortality-at-age curves derived from stranding data obtained in Galicia (NW Spain). Their results show an effective annual population growth of 0.912, which indicates a population decline, likely due to an unsustainably high by-catch rate. Saavedra *et al.* (2015b) discussed how a multispecies model such as the one currently used for the assessment of the southern hake stock could be improved by including bycatch information and cetacean population models to help provide information on the role of cetaceans as predators but also taking into account the impact of fishing on cetaceans.

Diet studies

Santos *et al.* (2014) provided estimates and confidence limits for consumption of sardine (*Sardina pilchardus*), blue whiting (*Micromesistius poutassou*), hake (*Merluccius merluccius*) and scads (*Trachurus* sp.) by common dolphins, harbour porpoises, bottlenose dolphins and striped dolphins along the Atlantic coast of the Iberian Peninsula. Their results indicate that cetacean predation probably has little influence on sardine population dynamics but could have a more significant impact on hake populations. The authors also highlighted the uncertainties and biases inherent in the information presently available on energy requirements, diet and population size,

with different approaches to estimate cetacean energy requirements resulting in figures that differ by at least a factor of 2.

García-Polo *et al.* (2014) examined stomach contents of cetaceans stranded in Andalucía over the last eight years, including the Gulf of Cádiz coast. Diet, derived from the identification of hard remains of prey collected from the stomachs, indicate that striped dolphin feed mainly on myctophids and pearlsides. Myctophids were also common in the diet of the common dolphin while cephalopods were the only prey found in the stomachs of Risso's dolphin.

Population structure

Fontaine *et al.* (2014) investigated the genetic structure of harbour porpoise over the species' distribution range using microsatellite DNA analysis. The authors proposed the existence of three ecotypes: in the Black Sea, the European continental shelf waters, and the upwelling areas of Iberia and Mauritania.

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e) Portugal

Surveys

In September 2014 under the Life MarPro framework, aerial surveys were conducted between the coast line and the 50 nm, covering an area of 62 716 km² with 3 322 km of survey effort along a systematic set of parallel 50 nm-long transects (approximately) separated by a distance of 10 nm and oriented either in east–west or north–south directions (only in the Algarve region). The abundance estimates concerning 2014 are not yet available. In September 2015, we will reach the fifth consecutive year with systematic aerial surveys.

In June 2015, an experimental aerial survey was conducted in offshore waters in cooperation with the Portuguese Air Force. After an institutional protocol, the MarPro survey team had access to an CASA C-295M, a twin engine high-wing airplane from the Squadron 502-Elephants, equipped with three bubble windows and a High-definition camera to record data on the survey line.

In this campaign, 14 transects were sampled covering a distance of 3700 km between 50 and 200 nm from the coast. In two survey days, it was possible to record 698 individuals belonging to the following species: fin whale, dwarf sperm whale, sperm whale, Risso's dolphin, pilot whale, Cuvier's beaked whale, unidentified beaked whales, striped dolphin, common dolphin, and bottlenose dolphin. The data collected will now be treated to produce abundance and density estimates in order to validate this approach as the standard methodology for offshore cetacean census beyond the 50 nm limits.

Dietary Analysis

Dietary studies have been conducted on the long-finned pilot whale population inhabiting Portugal, Galicia and Scotland (Santos *et al.*, 2014, Monteiro *et al.*, 2015). A stomach contents analysis recently performed on pilot whales stranded in Portugal (n=6), Galicia (n=32) and Scotland (n=10) showed the occurrence of geographical, seasonal and ontogenetic variation in the ingestion of the main prey, namely *Eledone cirrhosa* and Ommastrephidae squids. In particular, whales from Iberia showed a

more diverse diet with a predominance of benthic and coastal octopus species (*Eledone cirrhosa* and *Octopus vulgaris*), while in higher latitudes there was a prevalence of pelagic and oceanic Ommastrephidae squids (Santos *et al.*, 2014). These results were further supported through the analysis of skin $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ stable isotopes (Monteiro *et al.*, 2015), which provides longer-term dietary information compared to stomach contents analysis. Skin samples of 68 long-finned pilot whales stranded in northwest Iberia ($n = 22$) and Scotland ($n=46$) were analysed using $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ stable isotopes and the quantitative estimate of the proportion of the main prey species in the diet of pilot whales was obtained through isotopic mixing models (SIAR). Stable isotope analysis revealed that 57.8–73.8% of the diet in Northwest Iberia consisted of curled octopus (*Eledone cirrhosa*), followed by European flying squid (*Todarodes sagittatus*, Ommastrephidae), while in Scotland the predominant prey species was either *Histioteuthis* sp. or *T. sagittatus*, depending upon the trophic enrichment factor applied. Considering that the Atlantic coast of Iberia was responsible for 95% of the landings of the main prey consumed by pilot whales in this area, between 2000 and 2010, these data provide trophic baseline information to be taken into account in fishery impact assessment studies and management decisions.

Diet studies are in progress for other cetacean species (years of collected samples in parentheses) such as the common dolphin (2010-13), bottlenose dolphin (2000-14), harbour porpoise (2000-14), striped dolphin (2000-14), and minke whale (2000-14) under one of the actions of the project Life + MarPro framework. This work is based on stomach content analysis in order to estimate prey preferences and mortality impact due to predation mostly on small pelagic fish. Priority has been given to the diet analysis of common dolphins, since it was determined to be the species that mostly interacts with the purse seine fishery (Marçalo *et al.*, 2015) and previous diet studies indicated that small pelagic fish, especially sardine, were their main prey (Silva, 1999). Temporal, spatial and biological variation in occurrence is being described and will be related to prey abundance. Daily consumption rates of small pelagic fish by common dolphins will also be calculated.

Stomach content analysis is also being complemented by use of stable isotopes to study trophic ecology (prey and foraging habitat) of those small cetaceans (common dolphin, striped dolphin, bottlenose dolphin and harbour porpoise) present in Portuguese continental coastal waters. Publication of these works is estimated for 2016.

Multi-approach population structure studies

In order to investigate the potential occurrence of population differentiation in long-finned pilot whales (*Globicephala melas*) in the North Atlantic, both biogeochemical (fatty acids and stable isotopes) and genetic (mitochondrial DNA) markers were analysed in animals from four regions within this oceanic basin: northwestern Iberian Peninsula (NWIP), United Kingdom (UK), Faroe Islands (FI), and United States of America (USA) (Monteiro *et al.*, in press). Genetic data revealed strong regional levels of divergence between most regions (except UK and USA), although AMOVA revealed no differentiation between eastern and western Atlantic. Results from biogeochemical tracers supported previous dietary studies, revealing geographic and ontogenetic dietary variation in pilot whales. Particularly, fatty acids revealed ecological differentiation between all regions analysed, while stable isotopes showed an overlap between some sampling regions, such as NWIP-FI, NWIP-USA and USA-

FI using $\delta^{13}\text{C}$ and UK-Fi using $\delta^{15}\text{N}$. These results suggest that both ecological and genetic factors may drive the levels of pilot whale differentiation in the North Atlantic. Although these results highlight some problems when assessing population structure across multiple markers and the ecological versus evolutionary timescales over which differences may accumulate, the data provide preliminary information about pilot whale diversity and stocks in the North Atlantic, giving essential baseline information for conservation plans.

Under the *Action Plan for the Conservation of the Bottlenose dolphins Population of Sado Estuary* of Instituto da Conservação da Natureza e das Florestas (ICNF), a project concerning fine scale population structure of bottlenose dolphins in the Iberian Peninsula has been conducted by Associação para as Ciências do Mar - APCM in collaboration with Instituto Gulbenkian de Ciência – IGC and Aveiro University. It focuses on the Sado resident population and the main goal is to combine molecular markers, chemical tracers, and environmental data to address fundamental questions regarding the population structure and the demographic history of both resident (the Sado population) and non-resident populations of bottlenose dolphins, primarily along the central Portuguese coast but also more broadly around the Iberian Peninsula. A multi locus (mtDNA, 20-25 microsatellites; MHC and SNPs) approach is being adopted. The biopsy sampling is still ongoing. Included will also be samples from strandings and biopsies from various contributors: ICNF (continental Portugal, Sado), SPVS (including mainland Portugal Algarve), DOP - Azores University (Azores), Whale Museum (Madeira), CEMMA (Galicia), CIRCE (Cadiz and Gibraltar). In addition, samples of bottlenose dolphins that exist in Portuguese museums will be used; eight of these probably belong to Sado population (the oldest is from the 19th Century). In total, to date, there are 216 samples for analysis.

Strandings

A formal stranding scheme covers the entire Portuguese coast, and strandings are reported to the Instituto da Conservação da Natureza e das Florestas (ICNF). This stranding scheme is divided into several regional networks, and a consortium of two Aveiro University, Minho University and SPVS is responsible for the systematic monitoring of three-quarters of the Portuguese mainland coast. In 2014 and 2015 (data until August 2015), 415 cetaceans were recorded and samples collected and archived in the Portuguese Marine Animal Tissue Bank (MATB – Portugal).

Bycatch data

By-catch of cetaceans has been continuously evaluated since 2009 using different methodologies: on-board observers, interviews with boat captains, voluntary logbooks, tag and release of dead dolphins at sea, and using electronic monitoring devices.

The results of these monitoring efforts were recently published (Marçalo *et al.*, 2015). Interactions between cetaceans and the purse-seine fishery operating along the whole Portuguese continental coast were studied based upon on-board observations from 2010 to 2011. Cetacean presence and mortality were estimated and characteristics under which interactions were most likely to occur were identified. Observations were made on 163 fishing trips (0.7% of the average annual number of fishing trips) and 302 fishing operations/hauls. Cetaceans were present during 16.9% of fishing events; common dolphins (*Delphinus delphis*) accounted for 96% of occurrences, mostly

overnight in summer and early autumn. Regression models showed that cetacean presence during a fishing set was significantly ($p < 0.05$) associated with sardine catches, effort, and latitude/longitude. Encirclement and mortality occurred in 2.3% and 1.0% of fishing events, respectively. Encircled species were the common dolphin, bottlenose dolphin, and harbour porpoise, but only common dolphin showed mortality (three individuals); raised to fleet level, estimated total mortality rates of common dolphins were 69 (95% CI 37–110) in the north and 91 (95% CI 55–165) in the south for 2010, and 78 (95% CI 47–140) in the south only for 2011. The estimated annual mortality rate due to purse seining is 113 (95% CI 3–264) common dolphins, which is ~0.63% of the current most optimistic estimate of population size for the Portuguese fishing area (SCANS II). The wide confidence limits, as well as variation between years, reflect low observer coverage, emphasising the need for increased monitoring to cover gaps in the spatial and seasonal distribution of observer effort and provide reliable estimates of bycatch.

Still within the Life MarPro framework, several approaches and experiments are being implemented to promote a reduction of cetacean by-catch. For example, the implementation of several manuals of good practice applied to the main Portuguese fisheries, aiming at promoting simple operational changes such as avoiding hauling in the presence of cetaceans. Besides good practice manuals, several boats are using pingers (Fumunda 10 kHz and 70 kHz models) to evaluate their effectiveness in reducing by-catch (purse-seine nets, beach purse-seines, gillnets and trammel) and experiments are also being made using acoustic enhanced nets with barium-sulphate. Final results will be presented in 2016. An experiment to reduce bottlenose dolphin predation upon black scabbard fish (*Aphanopus carbo*) captured in deep-water long-lines will be initiated this year in the Centre of Portugal.

Other projects

Within project CetSenti-Cetaceans as marine ecosystem health sentinels (an FCT funded project, RECI/AAG-GLO/0470/2012) coordinated by the University of Aveiro, studies are continuing as planned. Contaminant analysis is finished and papers on heavy metal concentrations on bottlenose dolphin and harbour porpoise are already under review. This project includes a systematic evaluation of dolphin fungal, bacterial and viral microbiomes at different body sites. Four manuscripts are in preparation, presenting the results obtained so far.

Since 2012, CIIMAR and the University of Porto (Portugal) in collaboration with CIMA Research Foundation (Italy), and now with Oceanlab (University of Aberdeen, Scotland), have started an effective low-budget project on cetacean distribution and habitat modeling in the Portuguese Exclusive Economic Zone (PEEZ). This project is using cargo ships from the company TRANSINSULAR (www.transinsular.pt) as platforms of opportunity, along the routes between Continental Portugal to Madeira Island, Azores Archipelago and Canary and Cape Verde Islands. The final and main goal of this study is to provide new insights into distribution, abundance and habitat hotspots, delivering predictive models to map, explore and predict cetaceans habitat in the area, addressing international and European conservation priorities and supporting management decisions. First model results were published in 2015 for the route to Madeira Island with data collected from 2012 to 2013 (Correia *et al.*, 2015).

From July to October, 2012 to 2014, a total of 103 sea surveys were performed,

resulting on 37 403 km of survey effort in the routes to Madeira (2012: 9 363 km; 2013: 10 394; 2014: 7 317 km) and Azores (2014: 10 329 km). Sightings were collected during surveys and opportunistically, with the dataset comprising also sightings from the crew, collected in trips during or outside the survey season. In the ASCOBANS extension area, a total of 10 species were identified totalling 270 sightings (Table 1).

Table 1: Total number of sightings overall and within the ASCOBANS extension area collected from 2012 to 2014. Opportunistic sightings are in parentheses

	2012		2013		2014	
	Total	ASCOBANS	Total	ASCOBANS	Total	ASCOBANS
<i>Delphinus delphis</i>	17(2)	15(2)	30(2)	23(2)	51(17)	18(9)
<i>Tursiops truncatus</i>	24(3)	16(3)	17(1)	8(1)	9(2)	1(0)
<i>Stenella frontalis</i>	5(0)	1(0)	10(1)	2(1)	9(4)	3(2)
<i>Stenella coreoleoalba</i>	0(0)	0(0)	3(0)	3(0)	41(4)	12(1)
<i>NI delphinidae</i>	24(12)	21(7)	47(8)	30(4)	81(23)	35(12)
<i>Ziphius cavirostris</i>	9(0)	4(0)	5(0)	4(0)	16(1)	8(3)
<i>Mesoplodon densirostris</i>	0(0)	0(0)	0(0)	0(0)	4(0)	2(0)
<i>NI Ziphiidae</i>	2(0)	1(0)	14(1)	8(0)	11(0)	7(0)
<i>Physeter catodon</i>	8(1)	0(0)	9(2)	1(0)	16(5)	1(0)
<i>Globicephala sp.</i>	2(0)	0(0)	1(0)	1(0)	1(1)	2(1)
<i>Kogia breviceps</i>	0(0)	0(0)	1(0)	0(0)	0(0)	0(0)
<i>Balaenoptera acutorostrata</i>	16(1)	8(0)	11(1)	7(0)	14(4)	8(3)
<i>Balaenoptera physalus</i>	0(0)	0(0)	0(0)	0(0)	4(0)	1(0)
<i>Balaenoptera edeni</i>	0(0)	0(0)	0(0)	0(0)	2(1)	0(0)
<i>NI Balaenoptera</i>	4(1)	3(0)	2(0)	1(0)	25(5)	11(2)
<i>NI Cetacea</i>	6(1)	2(0)	14(1)	7(1)	16(3)	11(2)

Highly sensitive species such as beaked whales have been routinely sighted during these surveys, and dolphin species, such as bottlenose dolphins, were often encountered in offshore areas (Fig. 6).

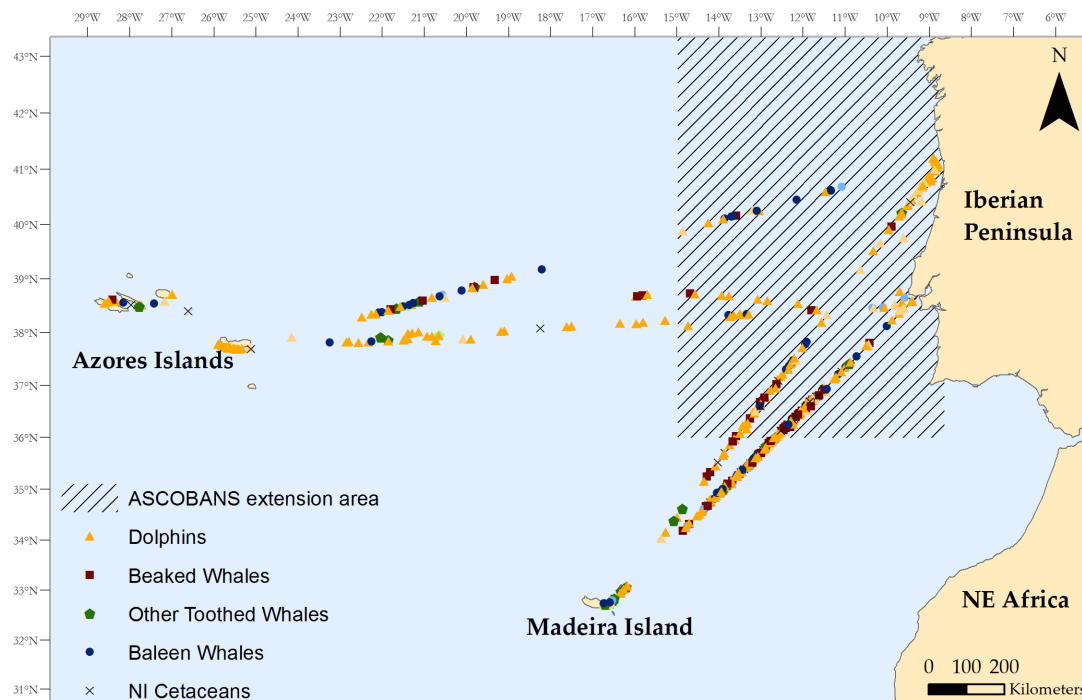


Fig. 6. Map of the total sightings collected from 2012 to 2014.
Opportunistic sightings are marked in lighter colours

Survey season of 2015 is undergoing with a new route from Continental Portugal to Canary and Cape Verde Islands, and seasonal surveys will start this year. These data will build on the current cetacean occurrence dataset in the area, possibly providing new insights on migratory routes.

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